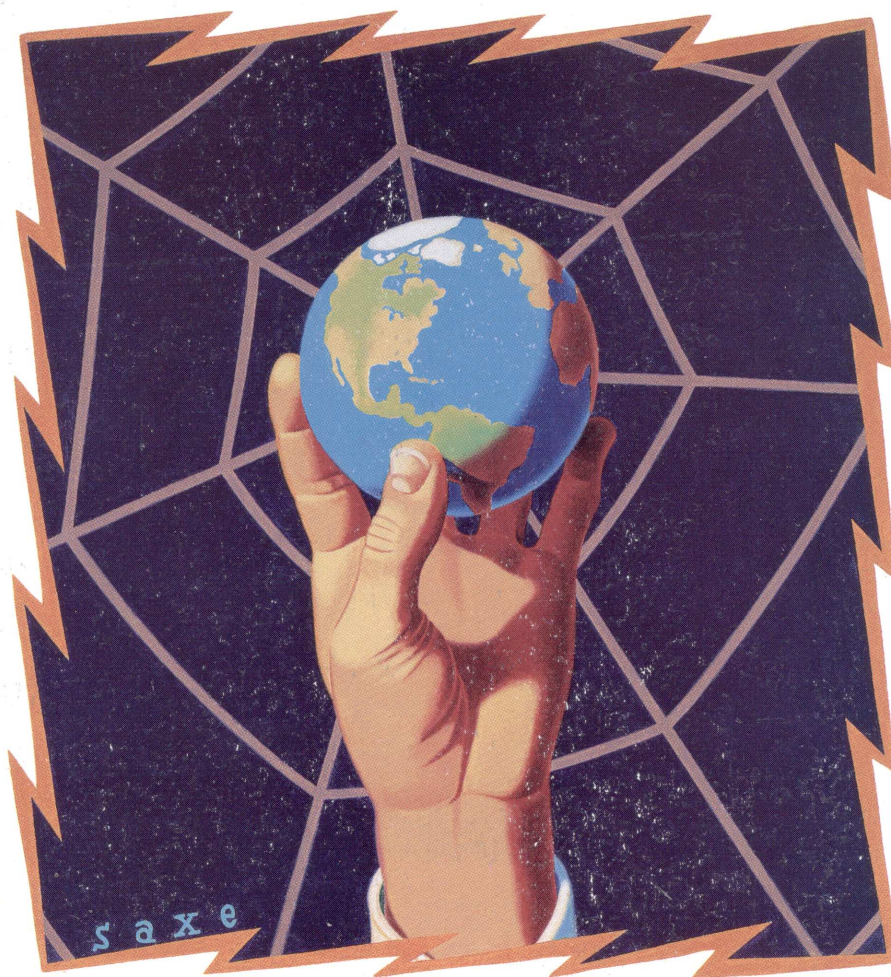


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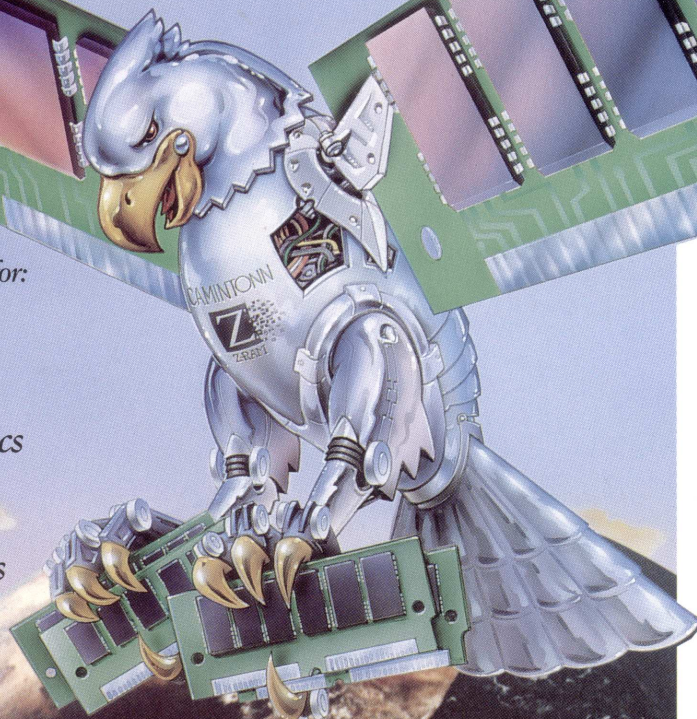
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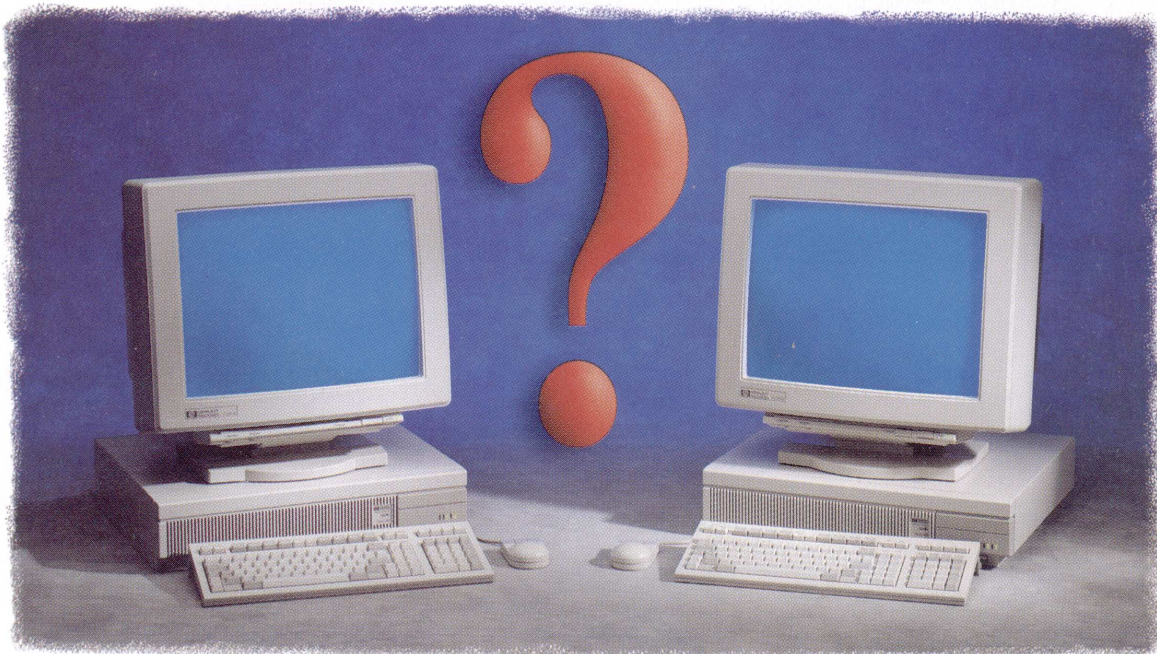
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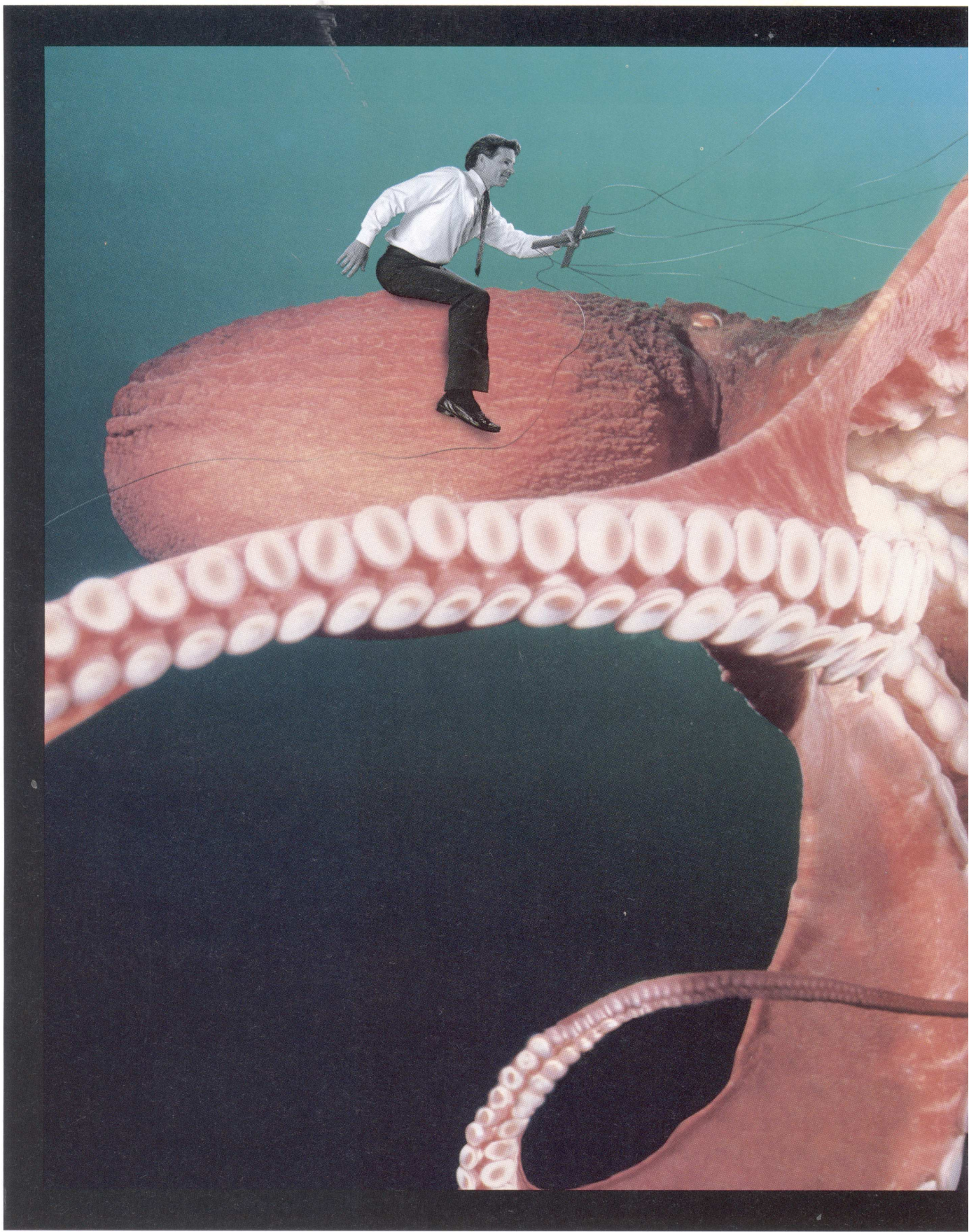
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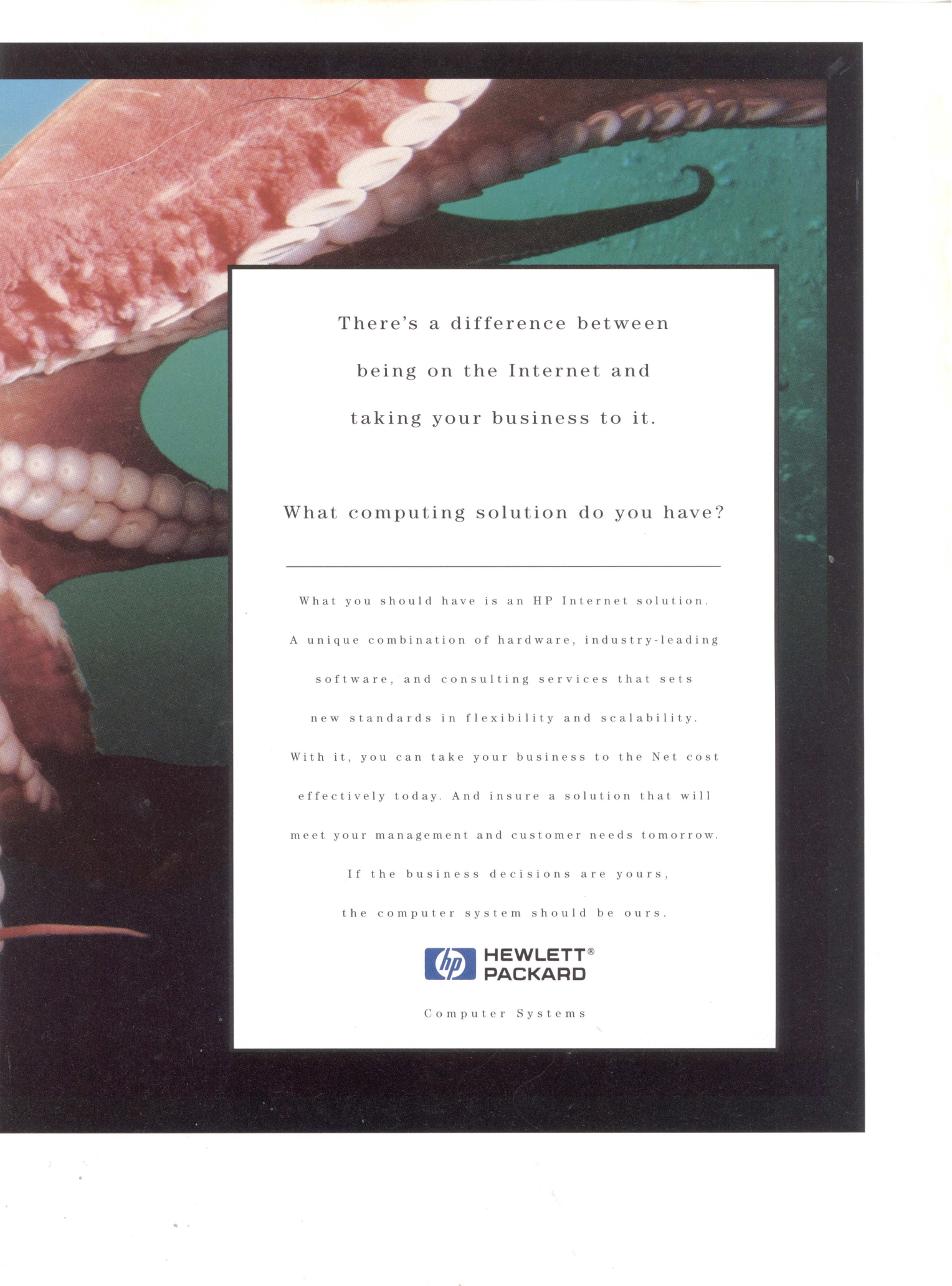
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Contents

Features

**Weaving a World Wide Web:
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Web Strategy**

by Chris Cobb 18

Setting Up Web Services

by Jim Matlock 34

**Where Are Your HP-UX System
Resources Going? Part 2**

by Marty Poniatowski 42

Departments

Q & A 8

HP 1000 Guru 70

CSL Perspective 78

Industry Watch 80

Product Focus 82

New Products 85

Columns

HP-UX Systems Administration *by Chris Curtin* 54

HP-UX *by David L. Totsch* 58

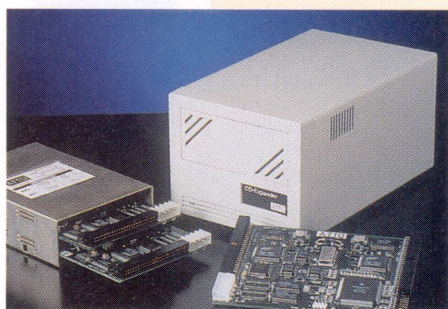
On Site *by Lisa Zahn* 62

X-Watch *by Larry Headlund* 66

Internet Goodies *by Joe Berry* 74

page 34

New Products
See page 85



Cover Story:
See page 18



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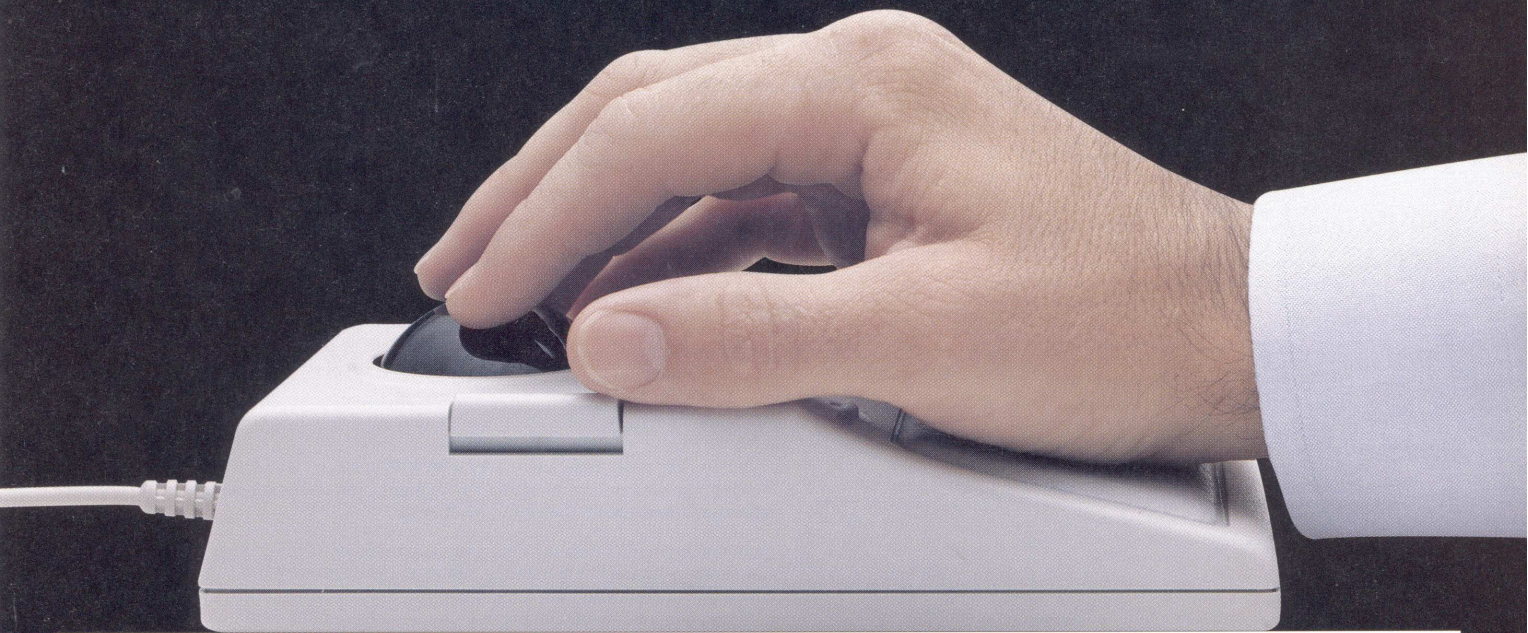
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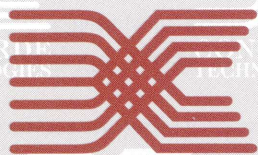
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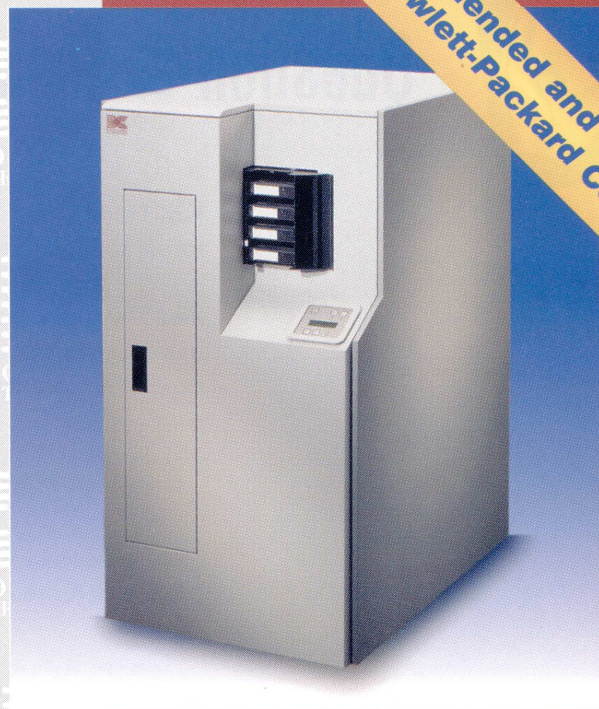


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LaserJet II, IID, III, IIID:

C2071A C2071B C2071E C2071S C2071T

These models have no direct replacement and therefore you will need to purchase the JetDirect EX product (an external box) and connect it to the printer's parallel port.

LaserJet IIISi, all LaserJet 4s and 5s that accept external I/O cards, PaintJet XL/300, DeskJet 1200C and 1600C, DesignJet plotters, and the HP Color LaserJet printers:

C2059A C2059B C2059E C2059T

These products can be replaced with the current J2550A or J2552A (Ethernet) or the J2555A (Token Ring). An upgrade program for these cards has been discontinued.

For the cards

J2337A, J2338A, J3339A, J2340A

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there is a Flash SIMM that can be installed that adds the latest features to the card and enables it to be upgraded via a download program. The product is:

J2346A (upgrade SIMM for Ethernet cards)

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Q: I am using the lpd feature of my JetDirect card but I am getting a trailing page with a few lines of printing status. How can I disable this?

A: The default for lpd support is to create a trailing burst page from the card. To disable this, use the lpr option *-h* (for BSD systems using the lpr syntax). On other systems, such as those based on PC platforms, the lpd interface may not have any configuration parameters and thus, you will have to turn off the banner/burst page in the firmware.

For the newer versions of the JetDirect cards (manufactured since about April 1995), you can telnet directly to the card's IP address and type the help command. There you can see the status of the banner page setting. If the banner page setting is not shown, you have an older card that needs to be updated by using the download program available from HP's Web page or by using ftp to: *ftp-boi.external.hp.com*.

Once you disable the card's burst page, only the host will be able to create a banner page as part of the data stream.

Q: My new JetDirect card has a telnet capability that my users discovered and one of them changed the IP address by mistake. How can I disable this telnet capability?

A: While you can't disable the telnet feature, you can add a password to protect the card from accidental changes. To do this, you telnet to the card and check the settings. If the password option is not shown, you have an older card that must be upgraded to the latest version of the firmware. Both the download manager as well as the firmware are available from HP's anonymous ftp site: *ftp-boi.external.hp.com*.

Q: I have an older version of JetDirect software on my HP 9000 Series 800 computer and none at all on my Series 700 workstations. Where do I get the latest software?

A: For all models, the JetDirect software was added to the Application tapes and CD-ROMs approximately August 1995. You can load the HPNP fileset from the Application media. For the CD-ROMs, there is a file called CONTENTS that shows you which CD-ROM to use.

However, in November 1995, a new version of JetDirect software for HP-UX and Sun was released. The previous versions (A.00, B.00, and C.00) are now replaced by D.00 and should appear on your next Application shipment. You can download the latest software immediately by connecting to HP's anonymous ftp server (or use your Web browser pointed to *http://www.hp.com*).

The new software offers a number of new features, such as support for the LaserJet 5Si, and a brand new utility called jetprint, which can be used as a graphics-based method to select a printer and the options used to print a file.

In the past, options to model script (the preprocessor script used in the spooler) were defined solely within the script, and more recently, with the *-ooptions* parameter to *lp*. Starting with D.00 version software, the model scripts will have their own man page. These scripts include *net_lj4x* and *net_lj5x* as examples. This makes the scripts less bulky and easier to document.

Q: I need to troubleshoot printing problems with JetDirect printers and plotters. What tools are available?

A: The first is to get the latest version of the JetDirect software, either from your regular software update media or from the World Wide Web or anonymous ftp. Then start with the *jetadmin* command. Information tools are in menu item #2, while root-only commands are in menu item #3.

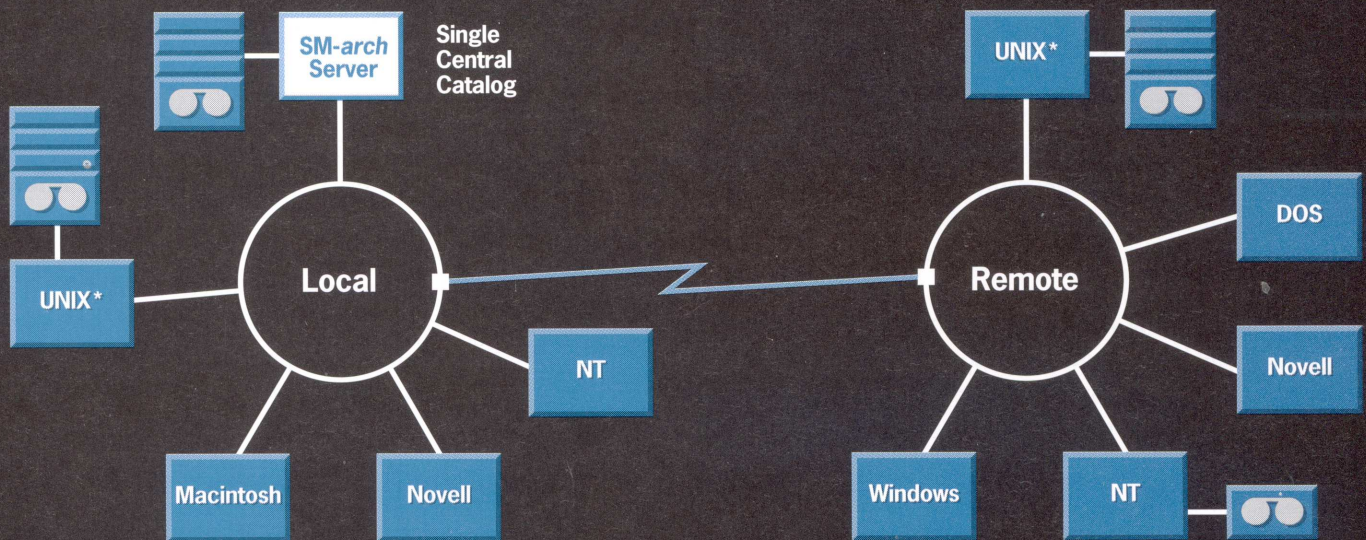
In menu item #2, select item 5 to query the printer as to the current settings. Make sure you have the correct subnet mask and gateway address if you have a large network. Also check that the bootp server is really the correct server. Multiple bootp servers are supported but can be a difficult sysadmin problem if they do not load the same parameters into a given JetDirect card.

Next, check the printer's ability to print a test page from *jetadmin*. This verifies all the network connectivity and is the same as calling *hpnprf* directly. There is a man page for *hpnprf* and it is located in */usr/lib/hpnprf/bin* (9.x and earlier). You can use *hpnprf*'s optional logging feature to watch the entire transaction.

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If only *lp* fails while *jetadmin* works, the problem is usually in the spooler's filesets and directories. Be sure that the permissions and ownerships of the spooler are correct (*/usr/spool/lp*) and that the JetDirect subdirectory *model.orig* is permissions 755 with owner *lp*. Also be sure that */dev/null* exists and is a true device file and not an ordinary file. Finally, check */tmp* for permissions 777, which is required for virtually every application.

Now check the spooler itself for required items. The command *pdfck* can do this. Run the command and specify the */system* directory for the spooler and its *pdf* (product description file). If you have applied patches to the system, the *pdfck* program will report some checksum errors, but this is normal. Errors that need to be addressed are those where the files are missing or not owned correctly or have wrong permissions.

If all is well, try using some of the undocumented JetDirect options. With the latest model scripts found in Version C.02.17 and higher, new debugging features have been added to help with solving JetDirect connections.

These *lp* options are:

-ohpnpflog When set in the *lp* command line, will cause the file */tmp/hpnpflog* to be created (or appended) and *hpnpf* will be run with: *-l /tmp/hpnpflog*

This log file tracks every step of the network sockets communication between *hpnpf* and the JetDirect card.

-odebugm When used with no other text, causes the file */tmp/<queue>* to be created as the output from the *model.orig* file rather than printing anything. It is useful in debugging escape sequences since it will be exactly what is sent to the printer with any *mod-elscript*-added characters included.

You can also use:

-odebugm /<some_path> /<some_file>

to specify a specific file and location. The leading */* is required.

With the new interface script, */usr/spool/lp/log* has more useful info in it. The default for *\$LPLOG* is */usr/spool/lp/log*. Here is an extract of some of the errors:

- > echo "\$debugf is not writable. write to \$TMP/\$MODEL." >> \$LPLOG
Occurs when the file specified in *-odebugm* is not writable.
- > echo "\$job: bad IP address. Quit!" >> \$LPLOG
Occurs when the program */usr/lib/hpnp/ip2long* *\$PERIPH* fails. *\$PERIPH* is the network name or IP address of the JetDirect card.
- > grep -v Warning \$LOG | cat >> \$LPLOG
Anything logged in the temp file *\$LOG*, which is: */tmp/hpnp.\$\$* where *\$\$* is the process ID. Normally this file is deleted after every print job. Lines with Warning are stripped out.
- > echo "Non PJI printer, turn off TEOJ" >> \$LOG
This message goes to *\$LOG* and then to *\$LPLOG* after the job is done. Shouldn't happen since internal options would have to be in conflict and these are normally set only in *jetadmin*.
- > echo "\$XJETMON \$display \$job &" >> \$LOG
Indicates that the X/window monitor program was scheduled for this job.
- > echo "hpnpd is not running, no job monitor" >> \$LOG
An attempt to use the X job monitor but no *hpnpd* running.
- > echo "\$REALMODEL \$options" >> \$LOG
- > echo "\$HPNPF \$HPNPF OPT" >> \$LOG
A list of *-o* options for the *model.orig* model and a list of the *hpnpf* options, which are extracted in the interface script.
- > Error messages from *hpnpf* and *xjim* program (stderr) are also logged in *\$LPLOG*.

Q: I am running HP-UX 9.05 on an HP 9000 Series 755 computer. I am having problems with SharedPrint/UX passing options to my printers. I need to be able to set up the printer to print landscape as well as portrait. However, since setting up SharedPrint I cannot get the *lp* spooler to recognize standard *lp* options used with the *lp* command. My default printer is a SharedPrint printer, and I have tried the following *lp* command with no luck:


```
lp -olandscape myfile
```

Am I doing something wrong? Does SharedPrint support options such as landscape and portrait?

A: First, yes SharedPrint does support landscape and portrait options if the printer you have configured is capable of printing the different views. To address your printing problem I will need to explain the different methods of printing through SharedPrint. The two ways to print a file using SharedPrint are by using the *sprint* GUI or, as in your case, the *lp* command line. Looking at *Figure 1* you can see that the *sprint* GUI allows the user to select landscape or portrait through the “Orientation” selection. The *sprint* GUI also includes an “Options” button that allows you to set any other options supported by the printer that you selected as shown in the “Printers:” button. The file to print may be typed into the GUI, selected through a “Add File..” menu pick, or dropped on the GUI by a VUE drag-and-drop action.

The command line method of printing requires that all information be supplied in the command line. However, SharedPrint does not use the standard *lp* options. The SharedPrint command line options are structured somewhat differently and require quotes around them on the command line as follows:

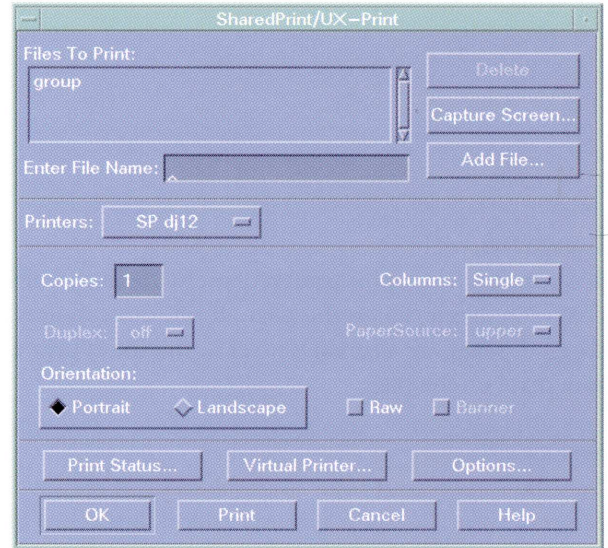
```
lp -o"orientation landscape" myfile
```

We have to quote the SharedPrint options because the *lp* command parser reads from the “-o” switch until it hits a space and assumes when it hits a space that all options are completed and the next string will be a file name specifier. As you can see in the above example command line, without the quotes the *lp* command would have tried to print two files named landscape and myfile. To correct your printing problems with SharedPrint, you will need to use one of the SharedPrint options listed below and quoted as shown above:

The options in this list start with the option name in bold, followed by acceptable values.

- **banner {on, off}**
Determines if a banner page is printed
- **bottom real-number**
Sets the bottom margin in inches for text and graphics print requests

FIGURE 1



- **copies integer**
Sets the number of copies to be printed
- **charheight real-number**
Sets the character height for text files
- **charweight integer**
Sets the character weight of text to a point size between -7 (a thin weight) and +7 (a thick weight)
- **columns {1, 2, 4}**
Sets the page makeup to a single column (1), double column (2), or four-column format (4). Note that no SharedPrint/UX filters use the 4-column format, but other filters can be created to use it.
- **duplex {long, short, off}**
Determines if the printer prints on both sides of the paper, using long-edge or short-edge binding, or prints on one only side (off)
- **fixedspacing {on, off}**
If on, uses fixed spacing for text
- **file_type string**
Tells the print request to use the file type that you enter rather than allowing SharedPrint/UX to detect the file type. For a list of values, see the *Types.cf* file.
- **filter_pipe string**
Identifies a filter that overrides the default processing performed by SharedPrint/UX. This option is primarily intended to invoke filters that have been added to SharedPrint/UX.

Continued on Page 14

■ **fitpage {on, off}**

If on, scales the graphic print request to the maximum size that completely fits on the page. If off, no scaling is performed, meaning that each pixel in the file is printed as one pixel on the page.

■ **fgcolor string**

Sets the foreground color of graphics print requests. No SharedPrint/UX filters use this option, but other filters can be created to use it.

■ **footer left-string/center-string/right-string**

Places the text string you supply at the bottom of each page. This string can include any of the characters defined for header.

■ **gamma real-number**

Sets the gamma correction value. To darken the image, use a number between 1 and 0; to lighten it, use a number higher than 1.

■ **header left-string/center-string/right-string**

Places the text string you supply at the top of each page. The following special characters return the values indicated when they are included in this string:

#	page number
*	literal space
%	date job is printed
!	filename (Requires the <i>-tfilename</i> option of <i>lp</i>)
\tab	escape character

For example, this command prints pages using a header of the file name on the left, the word *Page* followed a space and the page number in the middle, and the date on the right:

```
lp -dLJet -tworksheet1 -o"-header !/Page*#/%" worksheet1
```

For example, the first page might have the following header:

```
worksheet1      Page 1      Tue Aug 31 17:52:04 1995
```

■ **italic {1, 0}**

If 1, prints text files using an italic font

■ **left real-number**

Sets the left margin in inches for text and graphics print requests

■ **lpi real-number**

Sets the number of lines per inch. The default value depends on the point size of the font.

To print text documents that are formatted for 66 lines per page, set the following options:

- lpi 6.3
- wrap off
- top_margin 0.25
- bottom_margin 0.25

■ **nobgcolor {on, off}**

If on, sets the background color to white

■ **orientation {landscape, portrait}**

Determines the orientation of the page. *portrait* prints the text or x-axis of the bitmap parallel to the short edge of the paper. *landscape* prints the text or x-axis of the bitmap parallel to the long edge of the paper.

■ **paperlength real-number**

Sets the length of the page in inches, if you set paper-size to variable

■ **papersize {variable, letter, legal, b, c, d, e, a3, a4, a5, b4, b5}**

Sets the paper size to one of these sizes:

variable	lets you set the size by paperlength and paperwidth
letter	8.50 by 11.00 inches
legal	8.50 by 14.00 inches
b	11.00 by 17.00 inches
c	17.00 by 22.00 inches
d	22.00 by 34.00 inches
e	34.00 by 44.00 inches
a3	11.69 by 16.54 inches (297mm by 420mm)
a4	8.27 by 11.69 inches (210mm by 297mm)
a5	5.38 by 8.27 inches (137mm by 210mm)
b4	9.84 by 13.90 inches (257mm by 364mm)
b5	5.93 by 9.89 inches (182mm by 257mm)

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CIRCLE 183 ON READER SERVICE CARD

■ **papersource {upper, lower, manual}**

Feeds paper from the upper tray, lower tray, or feeds paper manually

■ **paperwidth real-number**

Sets the length of the page in inches, if you set papersize to variable

■ **pitch real-number**

Sets the number of characters printed per (horizontal) inch. The value is used only if fixedspacing is set to on.

■ **pixleexp integer**

Identifies an expansion value for each pixel in a bitmap image. To enlarge the printed image, enter an integer greater than 0; to shrink it, enter an integer less than 0.

■ **printqa integer**

Sets the output quality. Enter an integer between 0 and 100, using 0 for draft quality (to save toner) and 100 for professional quality.

■ **resolution real-number**

Sets the resolution of the page in dots per inch (dpi). The default is 300 dpi.

■ **raw {on, off}**

Submits the file to the requested printer, ignoring all other options

■ **right real-number**

Sets the right margin in inches for text and graphics print requests

■ **startpos {on, off}**

If set to on, positions the graphic at the top left margin. If set to off, centers the graphic on the page.

■ **symbolset string**

Sets the character set mapping, defining how character codes are mapped to symbol shapes. For character sets you can use, see the configuration file for this printer.

■ **tab integer**

Sets the number of spaces between tabs

■ **top real-number**

Sets the top margin in inches for text and graphics print requests

■ **typeface string**

Set the typeface for text files to one supported by this printer. For typefaces you can enter, see the configuration file for this printer.

■ **wrap {on, off}**

If on, wraps lines that exceed the right margin. If off, truncates lines that exceed the margin.

Q: I am running on an HP 9000 Series 715 workstation. I have loaded HP-UX 9.05 and am now in the process of loading the applications I need. One of my applications requires a license server to be running on my workstation to ensure the software is used properly. Does HP have any license server software available for use with the Series 700 workstations?

A: Yes, HP actually supplies a license server with the core HP-UX operating system. In fact, it is probably already loaded on your 715. The name of the license server is *NetLS*. It is loaded in the file sets that have names beginning with *LSSERVER*. The *NetLS* license server is a network-based licensing scheme used by software developers to protect their software. It consists of a server daemon, *netlsd*, and the tools to administer entering and modifying the licenses. The *NetLS* license server uses *NCS* as a communications mechanism for its client server license control. You will need to start up *NCS*, if you have not already, before starting *NetLS*. Once *NetLS* is running and you start an application that requires a license, the application will contact the license server via *NCS* and request a license to run. The server will validate the request and grant a license if it is a valid request. For more information on *NCS* and *NetLS*, see the following manuals:

NCS: Managing NCS Software

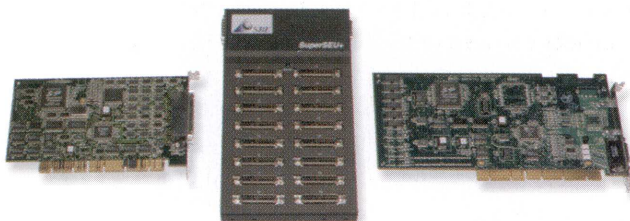
NetLS: Managing Software Products with the Network License System

Questions are answered by Bill Hassell and Rudy Stanley, who are both support engineers at the Hewlett-Packard Response Center in Atlanta, Georgia. Bill Hassell's e-mail address is blh@hpuaerca.atl.hp.com; Rudy Stanley's is brst@hpuaerca.atl.hp.com.



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CIRCLE 29 ON READER SERVICE CARD



WEAVING A WORLD-WIDE WEB

An Overview of Hewlett-Packard's Web Strategy



*Oh, what a tangled Web we weave,
When first we practice HTTP.
— with apologies to Sir Walter Scott*

Don't read this article! If you want definitions for all those weird Web acronyms and abbreviations, you will be decidedly disappointed! If you need tips writing slick HTML table formatting tags, walk away now. If you are looking for information on "How to set up a Web server," read Jim Matlock's article on page 34.

by Chris Cobb

Once you've "been there" and "done that" and are interested in *why* HP chose the Web strategy it did, then sit back, read on, and I'll spin you a tale that you may enjoy. This article is based on Web experiences within HP over the last twenty months and details the How come? of HP's strategies rather than trying to be yet another "How to" didactic.

Most of this discussion will focus on the use of Caching Web Proxy servers and how they relate to Web browsers, firewalls, and Socks servers. In addition, there are some interesting reporting and billing issues that deserve special mention. The rest of this article will touch briefly on other elements of a successful corporate Web strategy, as shown in *Figure 1*.

Background

The World Wide Web hit HP with force in May 1994 when HP Labs in Palo Alto, California organized a three-day Web conference to focus on this new technology. Intended for R&D engineers and managers, the conference was attended by HP people from around the world, and the most remarkable thing about this conference (at least to this attendee) was that people from every functional area represented, including Finance, Marketing, Personnel, etc., were *all* getting excited over the possibilities that the Web provided.

Within days Web servers were spring-

ing up at most HP sites around the world and "everyone," it seemed, was installing Mosaic on a desktop computer. In the brief time since then HP's internal Web has "morphed" from an entirely grass roots phenomenon to become an important business tool that is rapidly becoming the communication medium of choice throughout the company. A good example of this is "Access HP" (<http://www.hp.com>), the official welcome page for Hewlett-Packard started by HP's Corporate Marketing Communications group; this Web site has received much acclaim for its clean design and ease of navigation.

As soon as the conference was over, several of us began "evangelizing" the Web and its capabilities to R&D labs on the Cupertino, California site. We started up Web document servers, made browsers available over the network, organized an informal Web SIG, and held a sitewide "Demo Day" to promote Mosaic and the Web.

At first, when Mosaic was the only browser available, it was easy to configure the UNIX version to access Web sites outside of HP's private network; however, at that time PCs running Mosaic could not easily accomplish the same thing. They *required another machine* to help them get through the "firewall," and the workstation on my desk became one of the first "Web proxy servers" used throughout HP. People quickly found out about this server; it was soon proxying requests for over a thousand PCs around the globe and, for a while, it proxied over 2 gigabytes of Web traffic each week.

Others around the company, excited by the prospects, started creating Web registries of the new servers, search engines that would "walk" the HP Web and build a list of URLs able to be searched by keywords, and index pages to the hot "Web sites *du jour*."

WebCOE

With the explosive growth of the Web and Web browsers, there was understandable concern in the HP Information Systems community over the impact of additional traffic, especially if it were caused by the browsing of frivolous sites on the open Internet. HP runs the largest private network in the world; with well over one hundred thousand nodes it is heavily used by divisions in their day-to-day business and no one knew how much impact all this Web browsing would have on network performance.

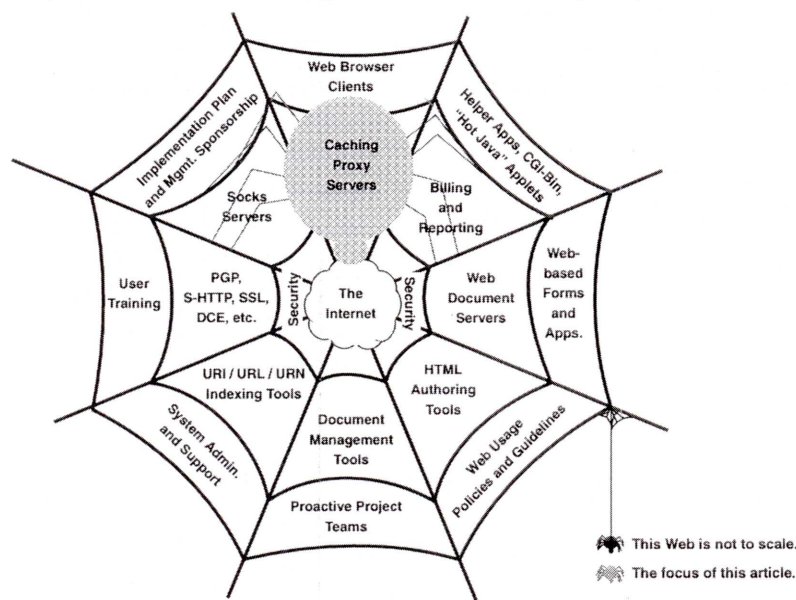
A Web strategy group, formed in the fall of 1994, tapped a few early adopters from around the world to identify best practices and to facilitate communication among the many disparate project groups working to develop Web tools, applications, and documents. Initiated by the Corporate Information Systems Services and Technology group (ISST) and funded by IT management, the group's charter was to define the key components of HP's Web structure:

- recommend a Web client (browser) application
- architect a server topology
- identify and resolve security issues
- identify and promote best practices

One of the first steps on this journey was to define a "common operating environment" (COE) for the HP Web that would be easy to install, require little support, reduce network costs associated with the Web, provide a billing model

FIGURE 1**The Elements of HP's Web Strategy**

One Key Element of HP's Web Strategy is the Rollout of Caching Proxy Servers



to HP divisions, and allow for adequate security of Web documents.

Several subgroups formed to address various pieces of the task:

- client (browser) selection
- client configuration and distribution
- proxy server configuration and distribution
- document server distribution
- training

In September 1994 I was asked to join the WebCOE proxy server team to leverage the Web experiences we had acquired in the Cupertino Operating Systems Labs. My manager, recognizing the opportunity that the Web presented our R&D Support group, encouraged his team to identify other Web project groups within HP so we could all maximize our efforts. The WebCOE project was a perfect fit for our group as each subteam was organized around specific short-term objectives that would not take anyone away from his day-to-day duties, and we could help incorporate the

WebCOE strategies into the CSY Division and Cupertino Site Web efforts.

Key Pieces

There are times when the "cosmic tumblers" fall into place and the resulting harmonic convergence changes the world overnight. The power of the Web is made possible by a few pieces of technology that appeared in just the right place at just the right time: Web servers (HTTP servers) and clients (browsers), Socks servers, better network security, and the ability for masses of people to access these pieces using their existing desktop systems.

Web Servers

The original two Web servers from CERN and NCSA have proved to be both robust and reliable; while there are always a few "bleeding-edge" users who need extra capabilities, the majority of the HP Web community settled on one of these servers for their Web sites. With the advent of "secure Web" servers, there was initially some concern that HP

would need to identify and purchase an expensive third-party Web server to allow access to these sites. However, an HP engineer in Mountain View, California came to the rescue when he developed a server daemon that would proxy the "security protocol" requests, and this server is now used, at a great cost savings, throughout HP.

Web Clients

Since the original Web client, NCSA's Mosaic, is free for the taking, it may seem like the obvious choice for a company-wide browser, especially if the alternative is to purchase 100,000 licenses! However, some considerations other than affordability influenced HP in evaluating and selecting a "recommended" browser:

- functionality and availability
- worldwide support
- PC, HP-UX, and Mac compatibility
- standards-compliance (security, HTML 3.0)
- strategic vendor relationship with HP
- 16-bit and 32-bit solutions
- network efficiency
- security (access control, encryption, authentication)
- integration with other technologies
- native language support

Besides NCSA Mosaic, contenders included WRQ, Spyglass, Netscape, and Spry. In March 1995, HP signed a license agreement with Netscape to use their Navigator browser, and response from early Netscape users throughout HP confirmed this choice.

Of course, any browser is only as powerful as the number of Web servers it can reach; there is an incredible proliferation of Web servers throughout the world, but many businesses have built

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Where they are *heard*.

SIGs also play an important role in channeling information directly to HP in order to impact HP product development. Our SIG members have had significant advocacy wins across a number of HP product lines. Recently, HP announced that ThinLAN/iX and ARPA networking products will be bundled into MPE/iX 5.0, a move Interex SIG members had advocated for unanimously. A clear SIG victory!

Find out more by calling us at 1.800.INTEREX, e-mailing us at membership@interex.org, or faxing us at 408.747.0947.



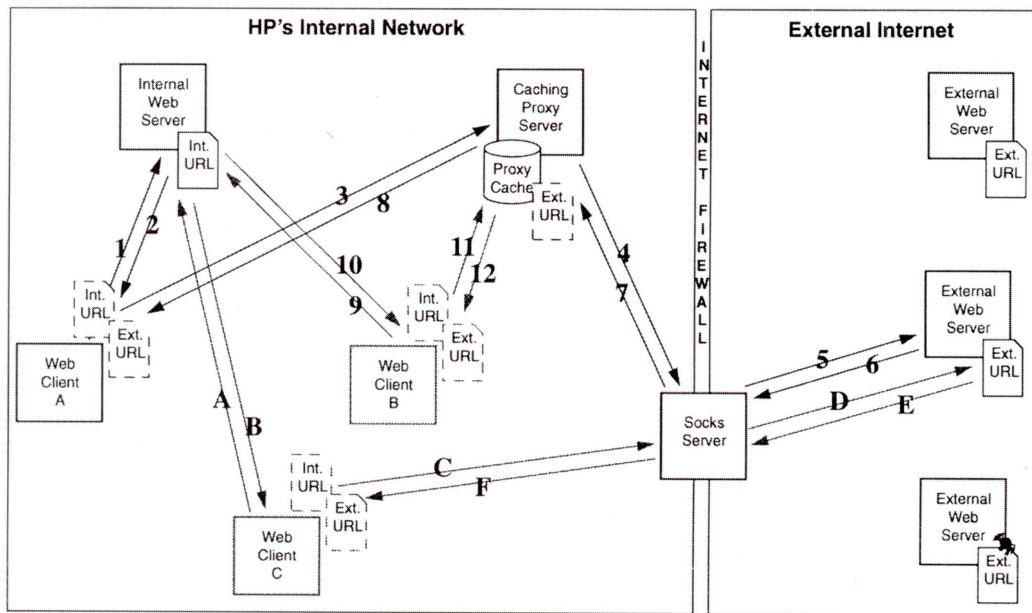
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*Shared Knowledge.
Shared Power.*

FIGURE 2

The Anatomy of a "Browse"

Non-socksified Clients A and B rely on a Proxy Server, while Client C accesses the Socks Server



sophisticated "firewalls" to *prevent* network access!

Firewalls and Socks Servers

Corporations spend considerable time and effort ensuring that the information residing on their computers remains protected from unauthorized access, and it is especially true in today's environment. Currently the Internet resembles America's Wild West of the 1800s with frontier-style settlers, entrepreneurs, and outlaws. To ensure the confidentiality of their data, many companies with internal networks use a firewall to prevent people on other networks from accessing their private network.

So what is a firewall? In the simplest sense, a firewall is merely a gateway, or a set of network "filters," between two networks to prevent unauthorized traffic from passing in either direction; these filters are semipermeable and do allow some traffic through such as e-mail. Until recently, however, firewalls made it difficult for people on a private network to access outside computers for legitimate business reasons such as

obtaining software developed at universities. In addition, with the increased use of the Internet for electronic data interchange (EDI) and competitive advantages among corporate alliances, it became more important to increase the "permeability" of firewalls while still maintaining secure access controls.

The "Socks" server was developed to solve this problem and allow people on an internal network behind a firewall *outbound* access to the external network while still preventing inbound traffic from coming through. With a Socks server on the firewall and "socksified" versions of *ftp* and *telnet* it is now possible for the "insiders" to access all of the public archives and bulletin boards maintained by universities and corporations on the "outside" Internet. Once a network application is "socksified," requests to machines outside the firewall, which previously would have been rejected, are redirected to the Socks server which forwards the request out through the firewall and returns the result back to the requesting application.

This was a crucial piece in enabling

the power of the Web. With Socks servers in place it is now possible for corporate Web browsers behind firewalls to access all of the Web servers on the "open" Internet, and companies can still feel secure that all the Web servers behind their firewalls are protected from unwanted access.

One engineer at HP's Fort Collins, Colorado site deserves a collective thanks from HP; Lamont Jones is responsible for single-handedly spearheading HP's Socks efforts and, as this was not part of his "real" job, most of the work was done on his own time. In addition, Lamont defined several extensions to the Socks standard that are in the process of being adopted by the original Socks developers.

Caching Proxy Servers

Let's take a look at what actually happens during a Web "browse." The numbered and lettered lines in *Figure 2* indicate the sequence of events as the three Web clients access Web documents (URLs) and the relationship of the Socks server on the firewall. In the

diagram, Web client "C" is an example of a Web browser program that is "socksified," that is, able to connect directly to a Socks server on the firewall and thereby gain access to Web servers out on the open Internet (outside of HP's private network). Back when Mosaic was the only browser, it was possible to "socksify" the UNIX version, and many people accessed the Web in this manner.

Way back then (only fifteen months ago!) it was not possible to "socksify" applications running on PCs, so a different approach was needed. It was easy, however, to configure a PC Mosaic client (Web clients "A" and "B" in the diagram) to access a Web server that would forward the PC browser's Web request out through the firewall via the Socks server and then return the result once it was received—hence the name proxy server.

It quickly became apparent to new Webmasters that, while NCSA's Web server was far easier to configure and administer as a document server, it was not able to act as a proxy server and that a dual server strategy would be necessary. The original Web server developed at CERN is not only able to act as a proxy server for Web clients but has an additional benefit as well: it can keep a copy of the URLs returned from outside the firewall. This way, when subsequent requests are made for the same URL by the same or another PC browser (see Web client "B" in *Figure 2*), they receive a copy from the proxy's cache. This results in increased performance, in addition to saving the network cost associated with fetching the original URL across the WAN.

The WebCOE team identified CERN's caching Web proxy server as a keystone (or perhaps a key "strand")

in the foundation of HP's Web strategy and encouraged every division worldwide to install one server per site in preparation for the upcoming client rollout. A "proxy server subteam" was identified and given the task of creating a distribution package that was easy to install, quick to configure, and simple to administer. In addition the package was designed to provide:

- a configuration optimized for proxying and caching
- basic statistics for proxy and cache usage
- a consistent implementation throughout HP
- central coordination of distribution to avoid duplicate site servers
- a "registry" of installed proxy servers
- an option to install a "socksified" or a "nonsocksified" proxy server

This last option was deemed necessary as some sites wanted the ability to restrict browsing to the HP Web only and prevent employees from browsing the "open" Internet. If the proxy server was not "socksified," it would not pass requests on to the Socks server and out through the firewall.

Plans for additional update releases included:

- enhanced reporting and billing information
- support for "multilevel" proxy configurations (explained below)
- automatic updates (optionally) as enhancements were made
- support for secure Web traffic (SSL, SHTTP)
- the ability for sites to do additional "local configurations"
- integrated WAIS proxy support

The last was necessary because the original CERN server did not have the WAIS libraries compiled in but instead would proxy WAIS requests to a machine at CERN to resolve the request. However, the result was not then able to make it back in through HP's firewall, and an integrated solution was required.

Installation Package

To make the initial installation and configuration as quick and easy as possible, the proxy server team created a complete installation package including a customization script that provided suggested defaults and displayed enough information for local Webmasters (who were probably unfamiliar with the CERN server) to decide how they could best set up their proxy server. This script was designed to be rerun as many times as needed and to allow subsequent changes and additions to the configuration package itself. The package can be both installed and configured in about 10 minutes.

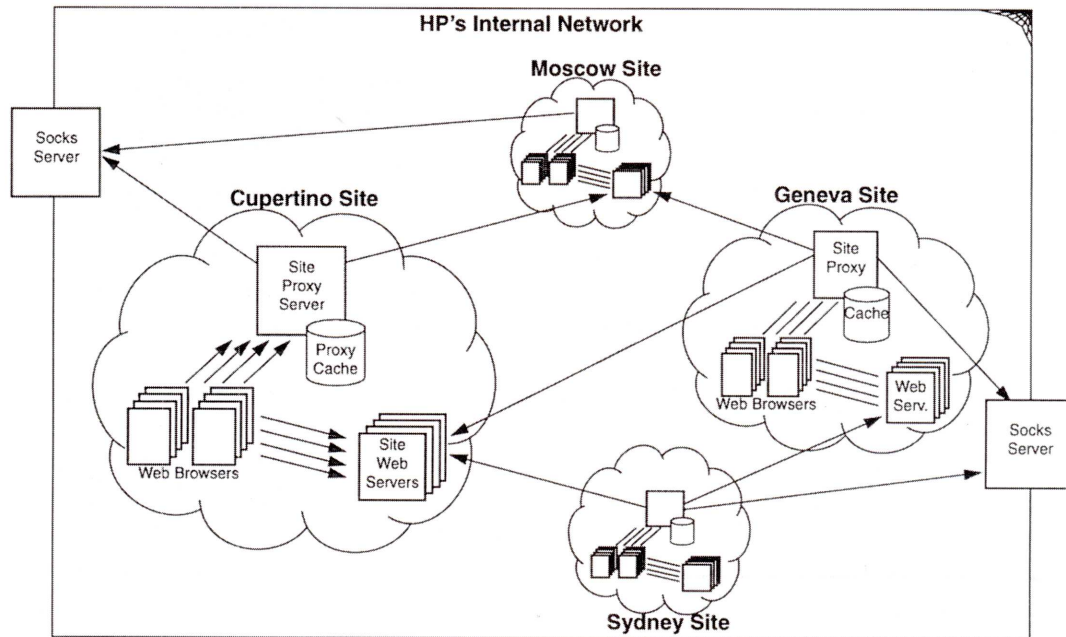
Once a local Webmaster responds to all the prompts, the script proceeds to modify the necessary files to reflect the site name, server host name, Webmaster's name, cache size and location, document "root" location, server port number, etc. In addition it will verify that all files are installed with the correct permissions, customize a "welcome page" for the server with local contact information, and then "register" the new site with the central list maintained on the WebCOE machine in Palo Alto, California. Also provided with the distribution was a nightly script to update proxy statistics, trim log files, and check to see if an updated version of the proxy server package needed to be installed.

Given the number of sites already

FIGURE 3

Treating Other Internal Sites as "External"

If Inter-Site IP traffic is billed as "External," Proxy Servers help reduce each site's bill



running Web proxy servers, one issue was how to allow these sites to migrate to the WebCOE package. The biggest potential problem was that the WebCOE team, to allow both a Web document server and the Web proxy server to run on a single machine, recommended a new network "port" number be used. How could Webmasters ensure that all the Web users on their sites were migrated easily and efficiently?

The solution was to provide instructions on modifications to the error messages returned by the proxy server that would let a person browsing the Web know *why* the server was not working instead of just appearing to be broken. This worked quite well on the Cupertino site, where we left a modified proxy server running on the original port informing people of the change. This strategy, combined with a note on the site's Welcome Page, postings in a sitewide Usenet newsgroup, and notification of all the support groups on site, resulted in a very successful conversion. In fact,

because of the increased visibility of the proxy server, we experienced a tenfold increase in the use of the server the first day after the conversion.

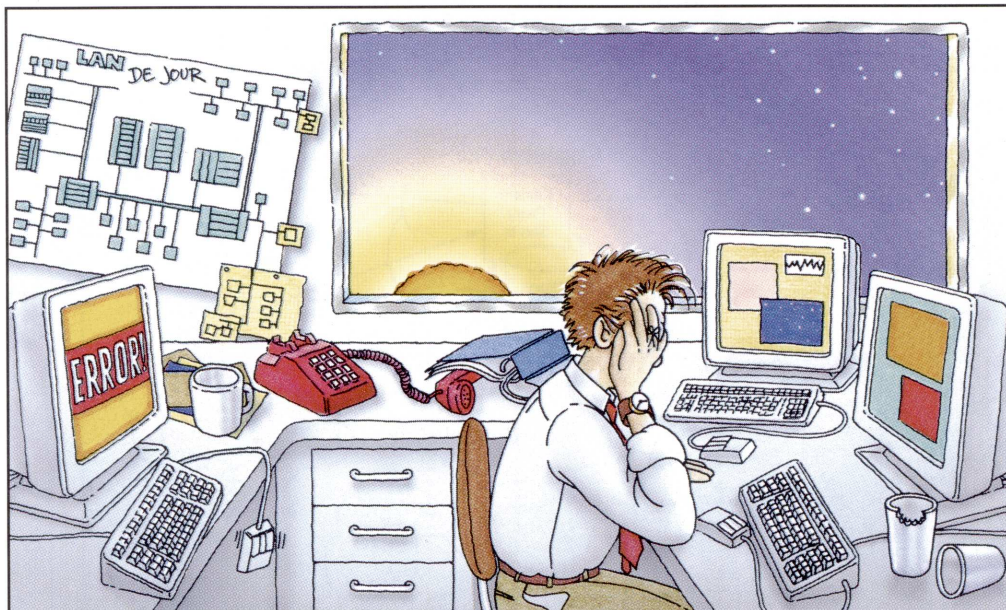
The HTTP protocol is efficient, but a good proxy server still needs to have enough CPU, disk, and network throughput to handle the load. On the Cupertino site, for example, we currently use an HP 9000/815 with a 1-giga-byte cache striped across multiple spindles. This server gets around sixty-five thousand proxy requests per day and, while it can handle the proxies, the "garbage collection" processes running in the background that keep the cache trimmed to its configured limit tend to overload this little machine. Currently within HP the cache "hit" ratios range anywhere from 25 to 35 percent and, taking into account roughly a 15 percent cache "hit" ratio from each Netscape client's local disk and memory caches, this results in a net savings of around 45 percent. For people interested in obtaining unsupported

copies of these scripts, a distribution package is available; see the references at the end of this article. (Note that this is available for non-HP people only! HP entities should use the established WebCOE installation procedures).

Redefining "External" Sites

HP's Corporate Network Services group (CNS) bills each site for all traffic onto the site and it is up to individual sites to determine how the monthly network charges are allocated. Therefore, in this instance, it is appropriate for a site to consider all off-site Web traffic as "external" and configure its server to proxy *all* URL requests that access off-site Web documents (see Figure 3). This is why the WebCOE team recommends only one proxy server per site: the greater the number of client browsers configured to access a single proxy server, the better chances will be that a URL is already in the site's cache. This depends, of course, on the size of the cache that is used.

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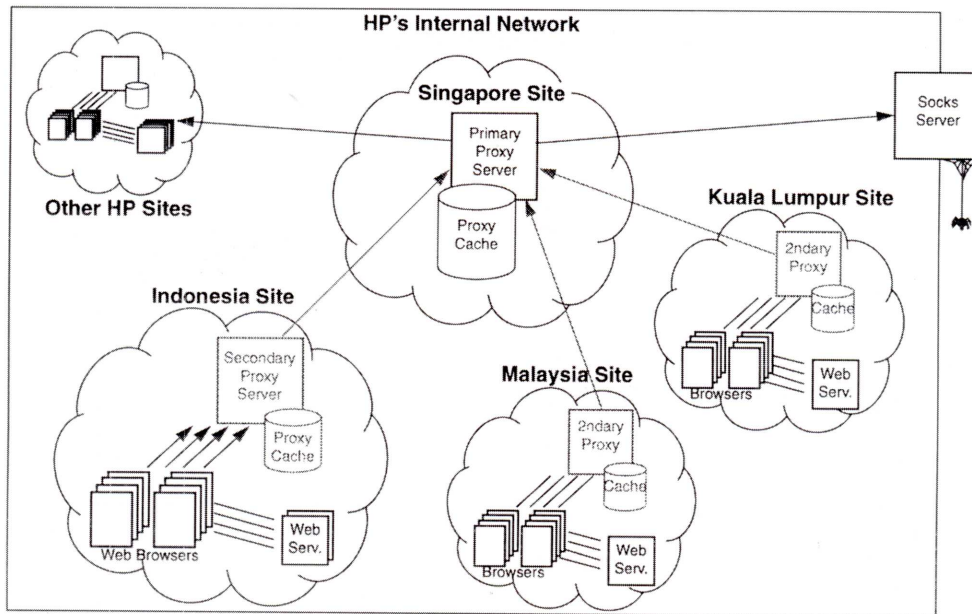
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FIGURE 4

Multi-Level Proxies

A Secondary Proxy Server uses another Proxy Server as its source for URLs



The Netscape Web browser can be configured to bypass the proxy server for local URLs via the "No Proxy On" setting; this is a good strategy in this situation as there is no additional charge associated with on-site traffic, the overhead of the proxy server is eliminated, and redundant disk space usage is eliminated (i.e., the URLs are not both on the site's document servers *and* in the site's proxy cache).

Secondary Proxies

An interesting feature of the CERN proxy server is that one server may actually proxy requests made by another CERN proxy server. There are some configuration parameters that will direct a "secondary" server to check its cache and, if the requested URL is not found locally, to redirect the client's request to another "primary" proxy server instead of to the document server where the requested file resides.

Some sites may benefit from configuring their proxy servers as "secondary

servers," as shown in *Figure 4*. Some reasons for this include

- network bandwidth is limited and/or expensive
- the network lines all lead to a "primary site" anyway
- caching across several small sites can improve cache "hit" ratios

In addition, the WebCOE proxy server team discussed the possibility of establishing "super" proxy servers around HP's firewall near each Socks server to provide huge disk caches of URLs from outside HP, further reducing network costs. This idea has not been implemented due to the cost of the hardware and the additional overhead; with yet another proxy server requests by Web browsers at a small sales office would be intercepted by four servers before even getting out through the firewall.

Smart Socks Routing

Another piece of the Web founda-

tion is to add intelligent routing to Socks traffic (see *Figure 5*). This way, when a person browsing the Web requests an external URL, the request is routed through HP's internal network to the Socks server nearest the external URL, further reducing network costs. This is all transparent to end users and does not require reconfiguring Web browsers; HP's Corporate Network Services is currently making the changes necessary for this to work. After this strategy is implemented, all Socks traffic including *ftp*, *telnet*, and other network applications will be routed in this manner, not just Web traffic.

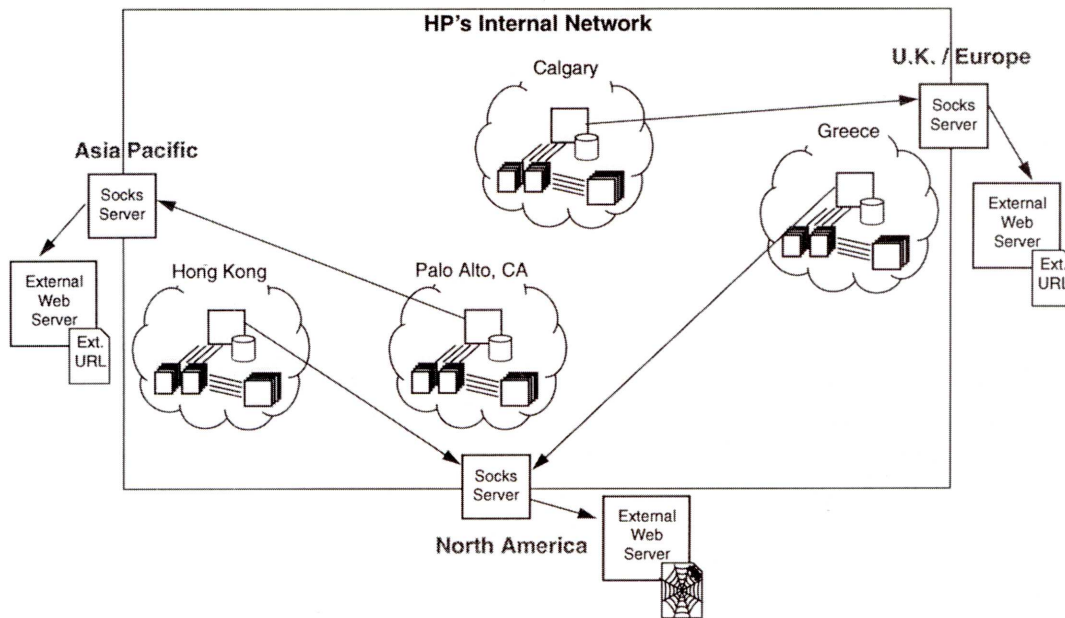
Reporting and Billing

Several interesting phenomena arise with proxy server use. One is that Web browsers become "hidden" behind the proxy server (and the Socks server); another is that it becomes difficult to determine fair billing based on usage. In addition there are document security issues (covered in the section below on security).

FIGURE 5

"Smart" Socks Servers

Smart routing sends requests out through the Socks Server nearest the external destination



Hidden Clients

With tight budgets and smaller staffs it is increasingly important to justify a department's investments in both time and money and Web development is no exception. Once a group sets up a Web server, management will soon want to review usage statistics to ensure appropriate return on the investment. Given a topology of caching proxy servers at each site within a corporation, counting the number of accesses ("hits") on Web pages is difficult at best and can be quite misleading. It is currently *en vogue* to proclaim the number of hits your Web page has accumulated but what does that number really mean?

When Web clients from other sites access your documents, the first request for each of your URLs may be cached on their server (see Figure 3). Subsequent access to those pages will not show up in your server's access logs. Also, *every* client probably won't be configured "correctly," so even if the only people interested in browsing your pages are on your site, a Web document designer can't be sure that the URLs haven't been cached and later accessed from the cache.

The good news: this just means you are probably *underreporting* the usage of your Web site. The bad news: it's not easy to get the "real" statistics. By the way, since every image access on each Web page also gets logged, be sure not to count every entry in your access log as a "hit" or you will be *overreporting* your server's usage! Within a closed environment such as HP's Internet it is possible to engineer a solution to this problem,

and a script distributed with the WebCOE proxy server package attempts to do this by copying each server's daily proxy log file to a central machine in Atlanta, Georgia. There the log files are interrogated and the "hidden" information can then be reported back to the server administrators if they are interested (as of this writing, this loop has not been completed).

However, this solution can take a large amount of disk space at the collection point; some sites have daily log files exceeding 7 megabytes, and Atlanta currently receives 70 MB of log files each night. With the current strategy to keep two months of worldwide proxy log information online, this means managing over 4 GB of log file data. Work is under way to consolidate this information and provide a mechanism whereby interested Webmasters can query a database for the statistics they require.

For groups running Web servers on the open Internet it is difficult to collect accurate usage statistics (e.g., Access HP); one could probably "guesstimate" approximate usage by identifying the proxy servers accessing a site, but this would be quite a labor-intensive proposition. (An alternative is to use "CGI" programming; see notes on this in the CGI Applications section, below.)

Fair Usage Billing

Network billing within HP is quite complex, the details of which far exceed the scope of this article. Briefly, Corporate

Network Services (CNS) bills each site for all traffic that arrives on the site with the exception of Socks traffic, which is billed in both directions; it is up to each site to allocate that bill among the various divisions and groups on the site. Some sites still bundle network costs into sitewide facility/occupancy costs, but most are moving to a direct billing model where department managers receive a bill for traffic to each individual IP address used by their employees.

Assume for a minute that you are an IT manager who "owns" the site proxy server and have just received a monthly network bill for traffic on the server. How are you going to slice this up among all the Web browsers accessing that server? The quick answer is to audit the server's "access logs" (that log all traffic through the proxy server), count the bytes for each IP address and send out a bill, but this model penalizes the very people who use your proxy server the most! Once this strategy becomes widely known, many in the user community may bypass your proxy server. Another answer is to create another usage charge for "Web service" on the site and tack on yet another line item on every department's bill.

The long answer, and one that can be made available by a central WebCOE group, is to include the "proxy logs" (that contain the portion of the "access log" requests that were found in the local cache) in the byte counter program and highlight the savings achieved by using the proxy server. We have even discussed giving groups a rebate based on proxy cache hits similar to the Discover Card's cash back program (or perhaps it should be called "cache back"). The point is to encourage people to use the proxy server, and to design

site Web services such that departments willingly participate in the use and funding of those services. HP sites not using a proxy server will see a greater increase in their network usage costs.

Security

No discussion of computers is complete without mentioning security. There are several aspects of Web security to consider from the firewall to the desktop, including security of the servers themselves in addition to the documents they serve.

Server Security

The WebCOE proxy server package is not designed to run directly on a firewall machine and relies on the Socks server to allow access outside HP. Given the nature of the server development and the potential for security problems arising through upgrades and enhancements (indeed several have already surfaced that are making newspaper headlines at the time of this writing), a good strategy is to rely on Socks for firewall security.

Another good strategy is to run the server daemons using a nonroot user; this way, in the event of security holes becoming known, trespassing "crackers" would be unable to completely disable or take over a server system.

Document Security

It is often appropriate to add password authentication, or host name/subnet access control lists to documents published on Web servers. As more company confidential and proprietary documents find their way onto a site's Web servers, accessing the information adds an increased administrative burden and appropriate people need to know how to

configure their browsing software specifically to access these Web documents.

For example, when creating host name or subnet access lists, it makes no sense to include proxy server(s) as this would defeat the purpose of the access controls. Now, however, the end users need to understand how to configure their browsing software to bypass the proxy server when accessing these documents. Also, for groups that span geographic locations, it may be necessary to grant access to some number of machines on other sites. Managing these types of situations is difficult and will not become easier soon. A good alternative is to use password security on Web pages that require access controls.

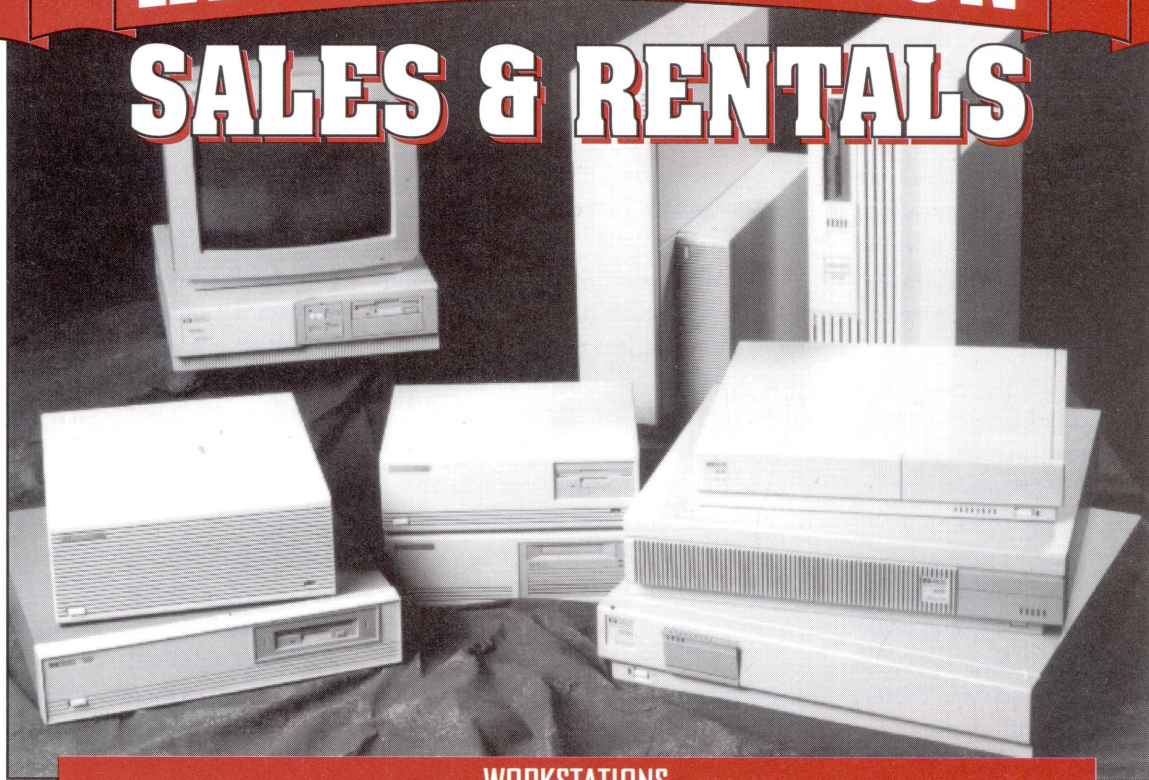
Results

In one sense Web browsing on the HP Internet has become a "nonevent." The Corporate Network Systems group (CNS) monitors traffic to the various HP sites during their client rollout phase and, while most sites do see some usage spikes during this time, Web usage quickly settles down to about 8 megabytes per user per month. This is similar to e-mail traffic and Web usage is no longer a cause for alarm.

In a broader sense though, the Web is quickly becoming the biggest event in HP's network history and is surely the slickest thing since sliced silicon. The WebCOE caching proxy server package has been well received and, as of this writing, there are CERN proxy servers installed at over one hundred and seventy-five HP sites worldwide. Work is still under way to enhance the functionality of the configuration scripts but the main thrust of the proxy project is complete. In addition, the Document Server subteam was able to leverage this work and

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is distributing similar configuration scripts with the NCSA document server installation package.

The Client distribution subteam has rolled out the browser to all sites and is well on its way to completing additional "helper application" configurations and distribution. Currently within HP over sixty-five thousand PC users and almost forty thousand UNIX users now have access to the Web.

HP sites have started doing their homework on projected network cost savings with a Web proxy server. One large site predicts that in 1996, given current growth rates and usage costs, they will reduce their overall network charges by approximately five thousand dollars per month just from using a caching proxy server (assuming a 20 to 25 percent cache "hit" ratio). In Europe and Asia/Pacific, where network bandwidth costs are significantly higher and bandwidth is generally more limited, the savings can be proportionally greater and a caching proxy server can help increase overall throughput and reduce response times.

By all accounts the WebCOE project has been a big success. Engineers, programmers, and end users can now focus on developing Web-based applications and tools without having to worry about defining a foundation for every project. In addition, divisions can feel confident that Web documents and forms created by project groups will be secure.

Other Topics

Other Issues to Consider While Web Weaving

The notes that follow are intended to raise some issues to consider while defining a companywide Web structure, and may well leave you with more ques-

tions than answers. (If, as a result, you arrive at exciting solutions, drop a line and let us know! You can help our Web efforts as well.) These notes are in no particular order.

Implementation Plan and Management Sponsorship

The Web is here, ready or not! While a lot of projects will be the grass roots type, a centralized team is easily justified if only to coordinate all of the disparate activities throughout an organization. Getting support and funding from mid and upper management is one key to success. Another is recognizing the opportunity to create a solid Web foundation that the entire company can build upon.

User Training

One important item that technical people may overlook is training end users in the use of Web browsing software. While "point and click" may seem simple to some, from the questions that keep popping up, like "How do I get on the Web?" and "Can you show me how to start browsing?," it soon becomes clear that a short class, training video, and/or online Computer Based Training (CBT) application is necessary. A short set of Web documents, for example, that are accessible from a site- or company-wide "Home Page" is an effective way to explain the basics.

Also, this can be a good opportunity to set expectations of "appropriate" Web use by both developers and those who just browse. (Note that "just browse" is not meant in a pejorative sense. As more and more company information is added to internal Web sites, browsing may soon become part of some people's job descriptions!) See "Web Usage

Policies" below for some further thoughts on setting expectations.

System Administration and Support

Many of the "early adopters" will figure out how to set up and support their own Web sites; these people can be a good resource for coaching and training those who will follow. A company-private Usenet newsgroup devoted to the Web is a good way to disseminate information, and is used with great effectiveness within HP (called *hp.infosystems*, it is a very active group).

New Web consulting firms are popping up daily, and some of these offer training on the subtleties of effective network security and performance. While administering a Web site is admittedly not a difficult endeavor, it may be appropriate to send a subset of the support staff out to gather this information and then train the rest of their groups.

Proactive Project Teams

Given the incredible speed of growth and change in and on the Web, you may find it a good idea to tap some of the early adopters from around the company to join a centralized project team and represent their area(s) of Web expertise. Geographical distance is less and less of a problem, and it is possible for team members from around the globe to meet via weekly telephone conference calls to collaborate on ad hoc projects. Be sure to set good expectations of the time, effort, and duration that will be required of each person since "real work" still needs to get done and the Web will often be a second (or third!) priority.

Web Usage Policies and Guidelines

Many corporations have existing policies for electronic communication and

use of company equipment; however, these may need updating as there are some significant but subtle differences between using e-mail, newsgroups, etc., and publishing documents on the Web. While most people would not imagine posting confidential data to newsgroups, for example, it isn't as clear to some why they should not publish the same information on internal Web servers. HP has established the following guidelines for placing information on the Web:

	HP's Internal Web	External Web
Company Private:	No	No
Confidential:	OK w/security	No
Proprietary:	OK w/security	No
Internal Use Only:	OK	No
Public Information:	OK	OK

Any HP company confidential or proprietary information must be protected with the appropriate access controls such as passwords and/or access permission lists. The Web gives people unprecedented power to provide and access information from their desktops and, as always, with power comes the responsibility to use it appropriately.

Another issue is the employee's expectations of privacy. At the Cupertino site we will not use log file information to determine who may be using the Web in an inappropriate manner (except in situations when absolutely necessary, such as obscenity or harassment cases where the Web was somehow involved). Even though other companies and sites may justify "Web police" activities we feel that, except for the rare "corner case," these issues are better resolved through training and existing problem resolution practices. This same attitude is also held for e-mail and Usenet log files, but HP's written policies are clear: the equipment belongs to HP and files may be examined when necessary to determine inappropriate use, and employees should not have any expectation of personal privacy for messages sent, received, or stored on HP systems.

Web Document Servers

Deciding which software to use on Web servers can be easy: just use the free servers available from NCSA or CERN. Within HP most of the Web servers used to publish information use the NCSA httpd software because it is easy to get up and running, and it's easy to configure and maintain the servers. There are people who use other HTTP daemons (e.g., Windows NT

Web servers) and, as more companies create similar products, there may be good reasons to purchase a Web server to gain additional functionality not available from CERN or NCSA.

HTML Authoring Tools

As of this writing there aren't any good solutions for simplifying the creation of Web documents; learning to write HTML "tags" is still the best way. Since the specification for the language is evolving so rapidly it's tough for editing tools to keep up. If you don't want the latest 3.0 features (but who doesn't?) Microsoft's Internet Assistant is nice for Word 6.0 users, and there are some other tools, such as HotMetal and FrameMaker 5.0, that can help get you started on your Welcome Page.

Document Management Tools

Producers of Desktop Publishing software are busy adding the ability to publish directly to the Web, but once you get your information on the Web, how are you going to keep it all current? In such a dynamic environment, tracking necessary updates to Web pages is an important part of a complete Web strategy. Do you wait until your favorite DTP vendor adds Web management functionality to your favorite publishing tool, or do you switch products so you can publish today? How much money and time do you have to invest in new tools? And how important are the tradeoffs?

Also, how are you going to manage the expiration of your Web documents? Like printed documents they get stale, and someone should be responsible for ensuring that the information remains current. Web document archives within HP require an "owner" for each document and, if the documents are not updated on a yearly basis (at most), they are "expired" and removed from the system. Someday soon, document management tools may be able to help with these efforts.

Indexing Tools

In addition to creating and tracking your HTML documents, it's nice to be able to index them once they're out there on the Web. As your server has an increasing number of Web pages, are you going to want to automatically generate indices of your documents? It's always nice to arrive at a Web site that provides a search interface based on keyword lookup for URLs on the server. It might even be nice to have document management tools help maintain the index and/or search database on your server.

HTTP, FTP, and Other Protocols

The HTTP protocol is an efficient one and it is easy to use it with *ftp*, *telnet*, *gopher*, WAIS, etc. If you decide to use a caching proxy server, be sure to define a good cache retention scheme for these other protocols. Decide, for example what tradeoff you want to make for *ftp* files given the availability of your disk space and the frequency (or lack thereof) that these files will be reused while they occupy space in your cache.

Helper Applications

Web browsers could not begin to support all possible data file types, and it is the ability to define "helper applications" that makes the Web so extensible. As more file types are developed, you need only install the application to display the file and *voila!* you're in business. Sounds simple doesn't it? Unfortunately it's not that easy. Not only do you need to license and distribute these applications to every computer running a Web client, but what do you do about cross-platform support? How do you display an Excel spreadsheet on a UNIX workstation, for example? Also, there are no good solutions for displaying PostScript documents on workstations or PCs without converting all your files to Acrobat's PDF format.

In addition, if you are distributing a standard "mailcap" file to associate a given MIME-type with an application, you won't know where PC users have installed their applications! The WebCOE client team had to design a generic "Windows association" helper application that would interrogate the WIN.INI file on Web client PCs to determine the location of installed applications, start them up, and then hand off the file to be viewed.

Web-aware Forms and CGI Applications

The Web is a "stateless" medium in that each request for a document, image, or file is initiated and completed as a separate and atomic operation. However, application developers often want to track how a person browses their site; for example, they want to develop customer profiles during single and multiple "browsing sessions" as people peruse their offerings. In order to accomplish this, Web developers are using the Common Gateway Interface (CGI) to programmatically build forms and documents "on the fly" based on user's responses and/or browsing habits.

It makes no sense to cache the output from a CGI script on a proxy server as this information won't be reused, and it will be interesting to see how the increasing use of Web programming will affect the effectiveness of proxy servers in the future.

What's Next?

Change, change, and more change! The next release of Netscape's Navigator, Version 2.0, will be available by the time this article is printed. It will include support for Sun Microsystem's "Java" language, which allows "applet" code to be downloaded along with documents and images to animate Web pages. Virtual Reality Modeling Language (VRML) from Silicon Graphics will allow you to create 3D Web space and let users navigate your site à la the "File System" in the movie *Disclosure*. There will be audio servers, video streams, teleconferencing groupware, and electronic cash that you will transmit to virtual banks. And you can be sure that all these terrific toys—ahem, make that *tools*—will do their best to suck up all of your remaining network bandwidth. Soon there will be tools available to create and manage

Web documents, in an attempt to harness the enormous volume of raw data being pushed out onto the Web and magically transform it into *information*.

It will be interesting to watch what companies start allowing their employees to create personal Web pages on the "external" Internet. The big issues to overcome are liability for content and whether links are "endorsements." Let's hope that during this transition phase employees won't abuse the privilege by violating copyright laws, company policies, or decency mores, and that we can all come to realize a link on a page does not imply any endorsement of content at the other end. After all, while a stand-alone Web page may be useful, it certainly isn't very interesting.

Summary

I hope that you have found this article both useful and interesting. If it helps you in defining and implementing your Web space or if you have questions, comments, or suggestions, please feel free to send me some e-mail. I'd appreciate hearing about your Web projects and will pass your feedback on to our WebCOE project teams.

When Sir Walter Scott wrote about tangled webs in 1808 he could not have imagined just how entangled Web weaving would become; although, come to think of it, in the same verse he also wrote "Charge, Chester, Charge! On, Stanley On!" Were the last words of Marmion." Perhaps Sir Walter would have made a good Webmaster after all.

References

The Web, of course! Everything you want to know is out there; all you have to do is find it. Here are some pointers to information on the World Wide Web

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Consortium, CERN, and NCSA, and getting started with Web development.

- <http://www.w3.org/>
- <http://www.cern.ch/>
- <http://www.ncsa.uiuc.edu/>
- <http://www.uwtc.washington.edu/Computing/WWW/WWWDev.html>

Some tools to search the Web are available as well:

- <http://www.lycos.com/>
- <http://www.yahoo.com/>

The WebCOE Caching Proxy server installation package is available *for non-HP use only*; HP entities should use the established WebCOE installation procedures instead. This package is unsupported and is made available as an example only:

- <ftp://www.cup.hp.com/pub/WebProxy.nonHP.tar.Z>

Also, a couple of the better books available are:

- *Teach yourself Web Publishing in 14 Days*, by Laura Lemay, published by Sams.net.
- *Firewalls and Internet Security*, by Cheswick Bellovin, published by Addison-Wesley.
- *Foundations of World Wide Web Programming with HTML & CGI*, by Tittel, et. al., published by IDG Books Worldwide, Inc. ■

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Setting Up Web Services

SETTING UP A WEB SERVER on your HP 9000 Series 700 workstation is easier than ever these days. By setting up your own server, you can control the access that others have to your Web documents, and easily provide the “fancier” options that you may have seen on other Web servers. In this article, we’ll talk a little about what a Web server does, show you how to set up NCSA httpd 1.4.2 on your machine, and give you some help on setting up your first Web page.

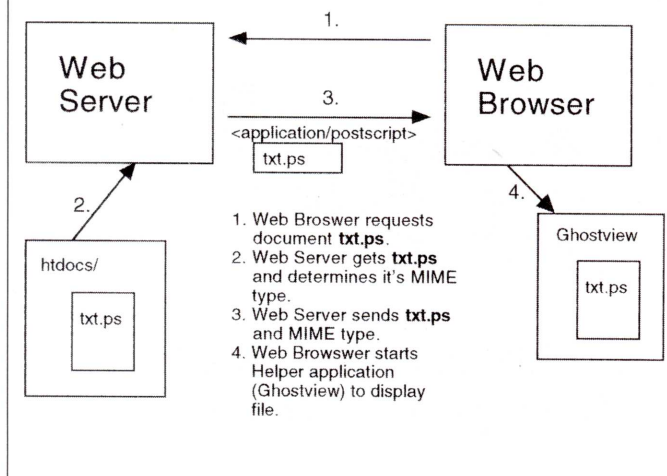
What a Web Server Does

Most Web travellers are familiar with the Web browsers, either free ones like lynx or Mosaic or the shareware/commercial ones like Netscape. These Web browsers use a protocol called HTTP (Hypertext Transfer Protocol) to get information from Web servers (see *Figure 1*). Included in the HTTP information transfer is something called a MIME-type, which indicates what type of document is being transferred. Using this MIME-type, or by using the postfix of the transferred file, the Web browser knows how to display the file or what helper applications are available to display the document. For example, a Web browser might request a file from a server called *txt.ps*. The Web server would indicate to the browser that the file is a PostScript file, and the Web browser might choose to launch Ghostview to display the file. For more information on how a browser determines how to handle different types of files, see the documentation for the browser.

b y J i m M a t l o c k



Illustration by Thien-Do

FIGURE 1 *Server-Browser Information Transfer*

Web servers are not just fancy FTP servers. Most Web servers (including NCSA httpd) have the ability to produce on the fly HTML files that describe a particular file structure. In this way, you can request to view a certain directory on a Web server, and the server can view the file structure, send a listing with icons and descriptions, and provide hypertext links to those files.

You can also use the information collected by Web servers in the logs to determine which files and areas are the most visited and which nodes are doing the accessing. There are a few public domain packages on the Net that produce Web-readable files and graphics that can then be used to determine which area should be removed and which area might need to be watched more carefully.

One of the best ways to find out what a Web server can do is to get one running yourself. We will be looking at NCSA's httpd 1.4.2. If you are still a novice to the Web, I'd recommend that you do some more exploring with your Web browser, and perhaps write some HTML documents that you can read as local files. Once you feel comfortable as a user, you should be ready to explore running your own server.

Obtaining NCSA httpd

NCSA provides httpd 1.4.2 to the public domain, so it's free to everyone. This Web server should fit the needs of most would-be Web masters. If you are looking for higher performance or have special concerns about data security, you may want to look into some of the commercial Web servers that are becoming available for the HPs.

To obtain httpd 1.4.2 you can use the URL:

```
file://ftp.NCSA.uiuc.edu/Web/httpd/Unix/
ncsa_httpd/current/httpd_1.4.2_hpux9.0.5.tar.Z
```

This compressed tar file contains the source, supporting files, and a precompiled binary for the HP 9000 Series 700 workstations running HP-UX 9.05. (This version should also run under later versions of HP-UX.) Expand this in any directory you like. It is preconfigured to exist in `/usr/local/etc` and run as root; however, only a few changes are required for httpd to exist in other directories or for it to be run by non-root user id's.

If you are running an older operating system or using a different HP platform, you will need to compile the source yourself. The make files are included, and will probably need a little tweaking, depending on what compiler tools you have available. When compiling this version for the HP 9000/425, I found it easiest to use the GNU C compiler when making a compatible binary. The make file already provides for using either the GNU toolset or the HP toolset.

Once you have expanded the tar file and attained the proper binary, you are ready to configure the server.

The Quick Guide to Configuring HTTPD

When the tar file is expanded, a `conf/` directory is created. This directory is the default location for the configuration files used by httpd. There are three main configuration files that you will need to change.

httpd.conf

Copy `httpd.conf-dist` to `httpd.conf`. The files ending in "-dist" are templates for the configuration files. By copying them instead of just renaming them, you can save yourself trouble if you somehow make a mistake and have to start over. Open `httpd.conf` with your favorite editor. Lines that begin with # are comment lines. Other lines contain directives that tell the server how it is configured. Some of these directives must be changed to match your configuration.

The `ServerType` directive indicates whether httpd will be managed through `inetd` or not. Usually it is best not to be managed by `inetd` unless it is critical that the server run all the time. Using `inetd` will decrease the performance of your server and cause the machine on which it is running to be more loaded. So the line with `ServerType`, should look like this:

```
ServerType standalone
```

The `Port` directive specifies the port on which httpd listens for requests. If it isn't specified, httpd assumes port 80. If you are root, this is fine; otherwise you need to pick a

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CIRCLE 122 ON READER SERVICE CARD



port above 1023, since ports below 1024 are reserved for root. Many non-root Web masters tend to choose 8080, so their Port line looks like this:

```
Port 8080
```

It is important to set the *ServerAdmin* directive to your e-mail address. The server will give users this address if any errors occur while trying to access pages on your server:

```
ServerAdmin myself@me.com
```

The *ServerRoot* directive is the directory in which you expanded the tar file, or where you intend to place *httpd*. This location is also where *httpd* will expect to find the *conf*/directory. If you do not set this directive, *httpd* will assume */usr/local/etc/httpd*.

```
ServerRoot /mydir/httpd
```

You may or may not need to set the *ServerName* address. This address is what is returned by *httpd* to the Web browser and is used on subsequent references to the server that are relative instead of absolute URLs. The best advice here is to try with and without. If you are using DNS, and you are using an alias to reference your server (like *www.mycom.com* for *myhost.mycom.com*), then you will most likely have to use this directive.

```
ServerName www.mycom.com
```

These are all the changes that have to be made in *httpd.conf* in order to get up and running.

srm.conf

Just as with *httpd.conf-dist*, you should copy *srm.conf-dist* to *srm.conf*. The directives in this file are used mainly for controlling how directories and files are viewed and MIME-typed.

Only the *DocumentRoot* directive may need to be changed. This directive indicates where files are located on the server. You should set this directory to the topmost directory of your HTML documents. If you do not specify a directory, *httpd* will assume that your files are located in */usr/local/etc/httpd/htdocs*.

```
DocumentRoot /mydir/mydocs
```

access.conf

Again, just as before with *httpd.conf-dist* and *srm.conf-dist*. This file allows you to restrict access to files and directories on your server and to control certain features. To get running, it is not necessary to make any changes to this file, but be aware that this is where you can add password protection or other restrictions.

Starting Your Server

If you are starting up stand-alone, and you put your server in */usr/local/etc/httpd*, you can just simply execute the binary. If you put *httpd* in another directory, you need to use the *-d* option to specify which directory it is installed in. For example, if you installed in */myhome/webserver* (which should also be the setting for *ServerRoot*), then you would start *httpd* with:

```
/myhome/webserver/httpd -d /myhome/webserver
```

If you are starting up using *inetd*, please read the documentation provided with *httpd* for further details.

Setting Up Your First Server Home Page

In order to facilitate testing, we will make this a very simple Web page. Change directories to the directory you specified as your *DocumentRoot* directory. If you did not make any additional changes to the *srm.conf* file, your default *DirectoryIndex* file should be called *index.html*. This file is the default name that the server looks for when a directory is specified in a URL. Edit *index.html* and insert the following text:

```
<Title>My Page</Title>
<H1>My Page</H1>
<p>
This is my web server home page.
```

This file, when interpreted by a Web browser, produces a heading that says My Page, and a short sentence after that. The Web browser will also indicate the title of the page as being My Page. This file, when interpreted by a Web browser, should look like *Figure 2*.

Accessing Your Server

Now you are running and you have a Web page, but how do you access your server? Use the following URL:

```
http://servername:port/path
```

Continued on Page 40

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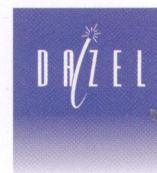
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CIRCLE 46 ON READER SERVICE CARD

Common Web Terms

As with any new area that comes along in computing, a whole new set of terms and acronyms have entered the vocabulary. Some old terms are popping up in the new context as well. Here are definitions for some of the latest terms dealing with the Web:

HTTP: HyperText Transfer Protocol

This is the protocol that Web servers (like the httpd daemon) use to talk to Web browsers.

HTML: HyperText Markup Language

HTML is a subset of SGML and is used to describe how text should be laid out when displayed by a Web browser. The "markup" consists of tags that indicate whether text is bold or italic, part of a list, a heading, etc.

URL: Universal Resource Locator

A URL is the address used to find information on the Web. The URL consists of the method used to gain the information (like http: or ftp:), the address of the server, and possibly the file on the server you wish to access.

MIME: Multipurpose Internet Mail Extensions

A MIME-type indicates the type of file a Web server

is delivering to a Web browser. By using the MIME-type, a browser can determine how the file should be displayed or whether the browser should start another application to process the file.

CGI: Common Gateway Interface

CGI is used by a Web server to pass information between a running application and the server. The *cgi-bin* directory contains executables that a server may execute if directed to by an HTML file.

GIF: Graphics Interchange Format

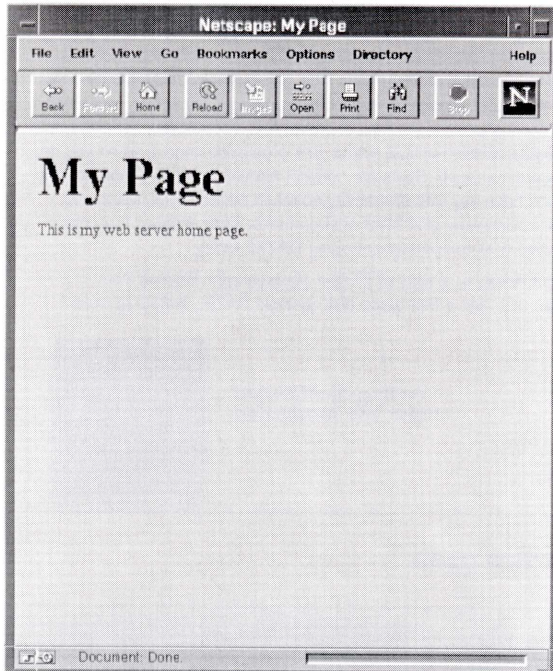
JPEG: Joint Photographic Experts Group

These terms have been around for a while, and they describe formats in which a graphic file can be encoded. Some Web browsers display certain graphic formats directly in a document, while others may need to start a helper application to display a particular format. Nearly all graphical browsers display GIF-formatted graphics.

Home Page or Welcome Page:

These terms refer to the Web files that usually first greet people when they enter a new Web site. Many times the term "Home Page" is used to refer to just about any Web file on any site.

FIGURE 2



where

- *servername* is the name (or alias) of the machine on which you are running `httpd`.
- *port* is the Port directive value. If the number is 80, it is not necessary to specify the port.
- *path* is the path to your document. Since you have a file named from the `DirectoryIndex` directive in the `DocumentRoot` directory, you do not need to specify any path. Again, read the documentation that came with `httpd` for details on how the path to a file is determined.

For example, if you set up `httpd` on host name *jupiter* with the Port set to 8080, you would use the URL:

`http://jupiter:8080/`

If all goes well, you should see your Web page on your browser. If you get errors:

- Use `ps -ef` and make sure your Web server is running.

- Check the permissions on the file and make sure that the User and Group specified in the `httpd.conf` file have permission to access that file.
- Try to open the file locally with your Web browser to make sure there is not a problem with the text within the file.
- If none of these suggestions helps, find a local Web master, or post a news item to a Web newsgroup such as *comp.infosystems.www.servers.unix*.

Getting More Information

The information provided in this article should be just enough to whet your appetite. There is much additional information available through books at a local computer or mainstream bookstore, and also on the Web.

If you are exploring on the Web, check out the following sites for more information on HTML:

- <http://www.ncsa.uiuc.edu/demoweb/html-primer.html>
- http://www.yahoo.com/Computers_and_Internet/Software/DataFormats/HTML

If you need information on NCSA's `httpd`, use the URL:

- <http://hoohoo.ncsa.uiuc.edu/>

Jim Matlock has been at Bell Northern Research/Nortel for seven years and has had many jobs there including telephony software engineer, HP workstation environment support, and test automation tools software engineer. On the side, Jim is also Web master for his department's internal Web server.

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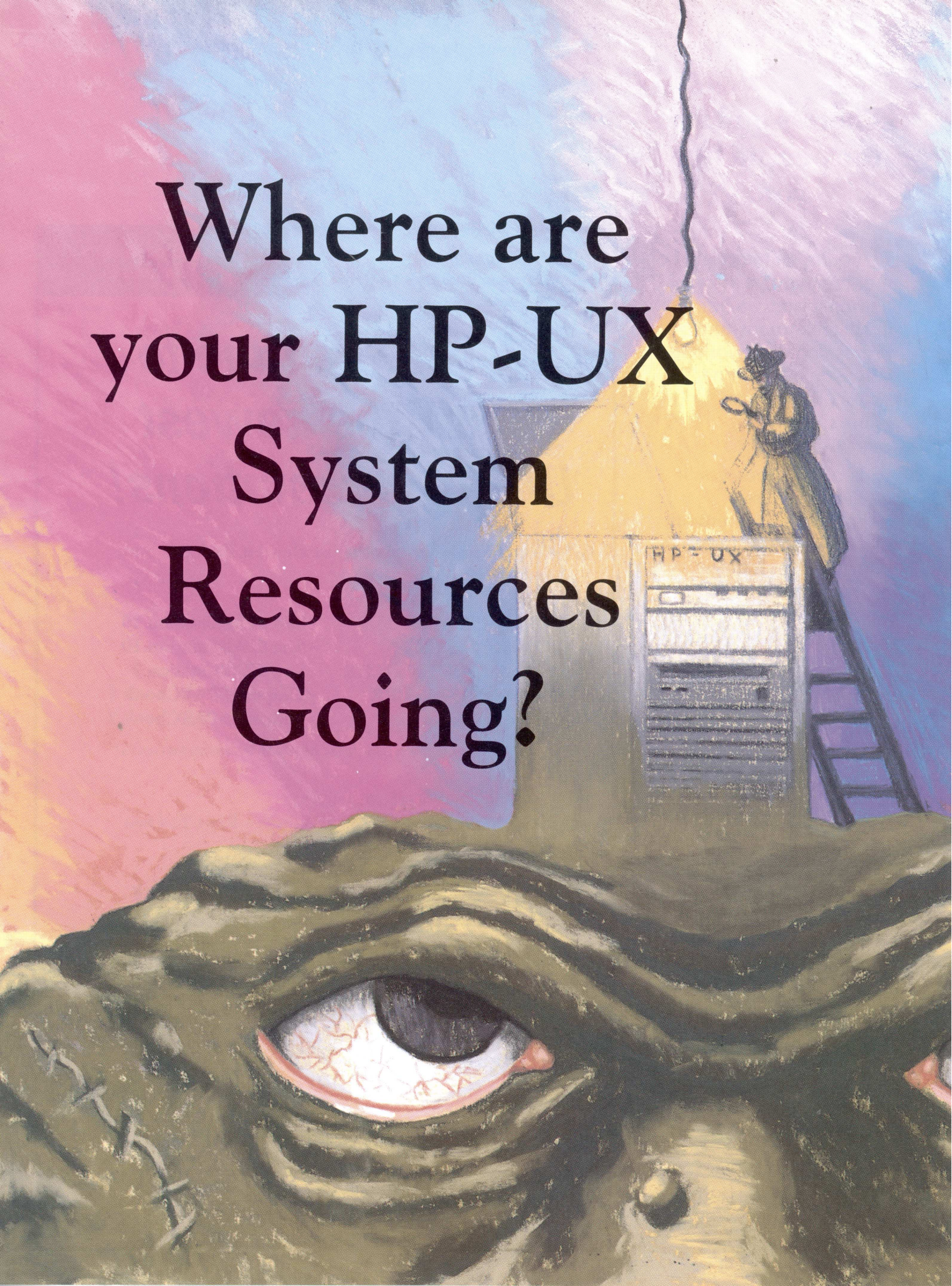


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CIRCLE 56 ON READER SERVICE CARD

Where are
your HP-UX
System
Resources
Going?



PART II

by Marty Poniatowski

In the last issue of *hp-ux/usr*, I described what your system components are (applications, data, CPU, memory, etc.) and HP-UX commands you can use to determine how these system resources are being used. In Part 2 I'll cover HP GlancePlus/UX and a case study showing how you can use these techniques in a real world example.

HP GLANCEPLUS/UX

HP-UX commands and shell programs require you to do a lot of work. With HP-UX commands you get the advantage of obtaining data about what is taking place on your system that very second. Unfortunately you can't always issue additional commands to probe deeper into an area, such as a process, that you want to know more about.

With HP GlancePlus/UX you can investigate a specific process in real time.

Figure 1 shows one of several interactive GlancePlus screens. There is also a Motif version of GlancePlus. I chose to use the character-based version of GlancePlus because this will run on any display, either graphics or character-based.

Two features of this screen are worth noticing immediately:

1. Four histograms at the top of the screen give you a graphical representation of your CPU, Disk, Memory, and Swap Utilization in a format much easier to assimilate than a column of numbers.
2. The "Process Summary" has columns similar to *ps -ef*, which many system administrators are familiar and comfortable with. GlancePlus, however, gives you the additional capability of filtering out processes that are using very few system resources by specifying thresholds.

Illustration by Barbara Melodia

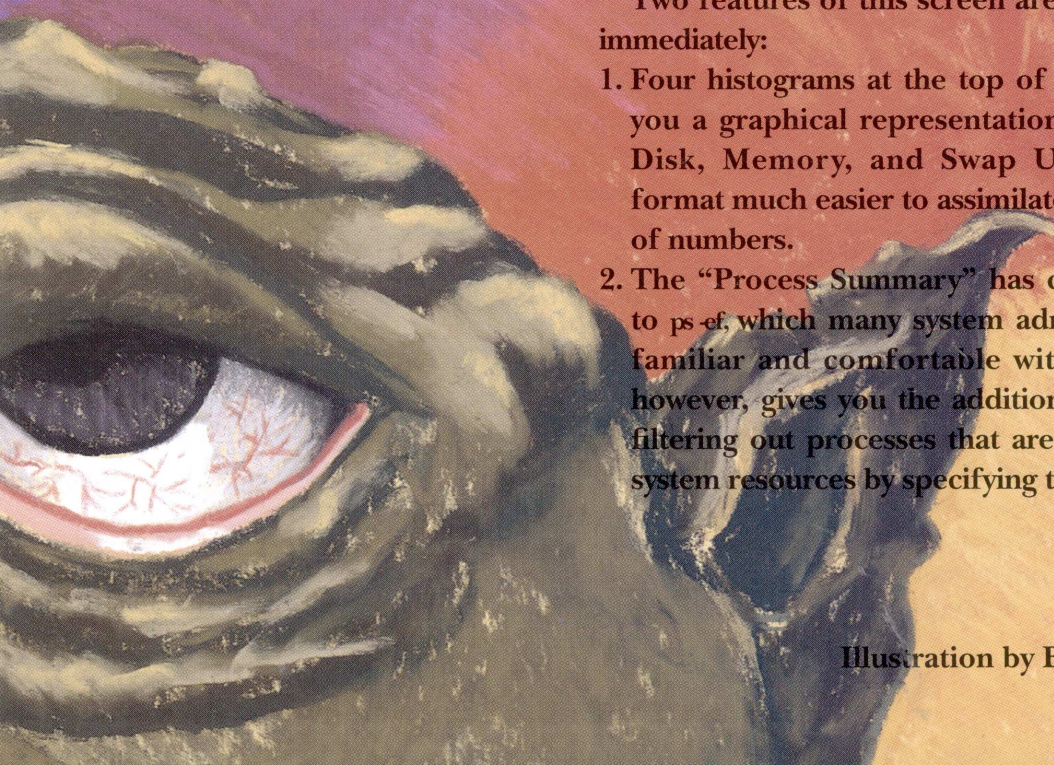
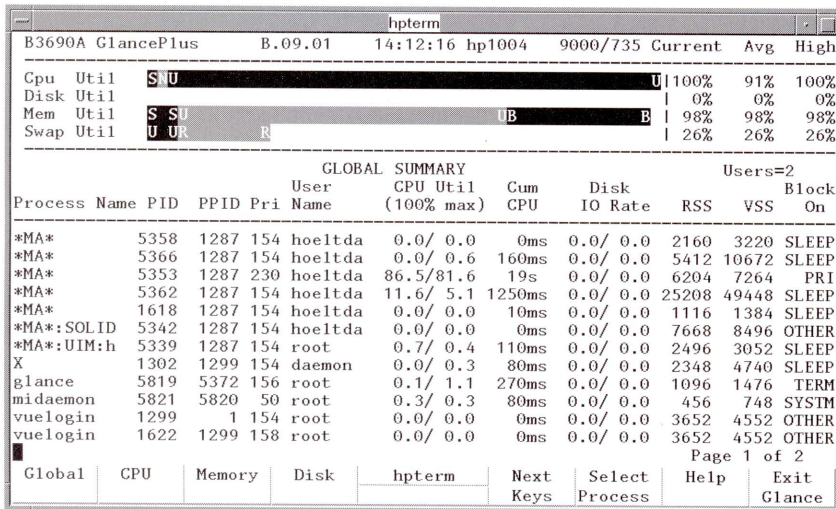


FIGURE 1



Using GlancePlus you can take a close look at your system in many areas including the following:

- Global Summary of your system (shown in the example)
- CPU Detail
- Memory Detail
- Swap Detail
- Disk Detail
- LAN Detail
- NFS Detail
- Diskless Server Resource Utilization
- Individual Process Information
- I/O by File System
- Queue Lengths
- System Tables
- Setting Process Thresholds

Since the Global Summary shown in the example tells you where your system resources are going at the highest level, I'll start my description here. Keep in mind that the information shown on this screen can be updated at any interval you choose. If your system is running in a "steady

state" mode, you may want to have a long interval since you don't expect things to change much. On the other hand, you may have a dynamic environment and want to see the histograms and other information updated every few seconds. In either case, you can change the update interval to suit your needs.

Global Screen Description

The Global screen provides an overview of the state of system resources and active processes. The top section of the screen (the histogram section) is common to the many screens of GlancePlus. The bottom section of the screen displays a summary of active processes.

Line 1 provides the product and version number of GlancePlus, the time, the name of your system, and system type.

Line 3 provides information about the overall state of the CPU. This tends to be the single most important piece of information administrators want to know about their system—Is my CPU overworked?

The CPU Utilization bar is divided into four parts:

1. "S" indicates the amount of time spent on "system" activities such as context switching and system calls.
2. "N" indicates the amount of time spent running "nice" user processes (those running at a low priority).
3. "U" indicates the amount of time spent running user processes.
4. "R" indicates real-time processes.

The far right of line 3 shows the percentage of CPU utilization. If your system is "CPU-Bound," you will consistently see this number near 100 percent. You get statistics for Current, Average (since analysis was begun), and High.

Line 4 shows Disk Utilization for the busiest mounted disk. This bar indicates the percentage of file system and virtual memory disk I/O over the update interval. This bar is divided into two parts:



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1. "F" indicates the amount of file system activity of user reads, and writes and other nonpaging activities.
2. "V" indicates the percentage of disk I/O devoted to paging virtual memory.

The Current, Avg, and High statistics have the same meaning as in the CPU Utilization description.

Line 5 shows the system memory utilization. This bar is divided into three parts:

1. "S" indicates the amount of memory devoted to system use.
2. "U" indicates the amount of memory devoted to user programs and data.
3. "B" indicates the amount of memory devoted to buffer cache.

The Current, Avg, and High statistics have the same meaning as in the CPU Utilization description.

Line 6 shows swap space information, which is divided into two parts:

1. "R" indicates reserved but not in use.
2. "U" indicates swap space in use.

All three of these areas (CPU, Memory, and Disk) may be further analyzed by using the F2, F3, and F4 function keys, respectively. When you select one of these keys, you move from the "Global Summary" screen to a screen that provides more in-depth functions in the selected area. In addition, more detailed screens are available for LAN, NFS, Diskless Server, Swap, and System Table. Most investigation beyond the Global screen takes place on the CPU, Memory, and Disk screens, so you'll want to familiarize yourself with those screens as well.

The bottom of the Global screen shows the active processes running on

your system. Because there are typically many processes running on an HP-UX system, you may want to consider using the "o" command to set a threshold for CPU utilization. If you set a threshold of 5 percent, for instance, then only processes that exceed average CPU utilization over the interval will be displayed. There are other types of thresholds that can be specified, such as the amount of RAM used (Resident Size). If you specify thresholds, you see only the processes you're most interested in; that is, those consuming the greatest system resources.

There is a line for each active process that meets the threshold requirements you defined. There may be more than one page of processes to display. The message in the bottom right corner of the screen indicates which page you are on. You can scroll forward to view the next page with "f" and backwards with "b." Usually only a few processes consume most of your system resources, so I recommend setting the thresholds such that only one page of processes is displayed.

Here is a brief summary of the process headings:

Process Name	The name or abbreviation used to load the executable program.
PID	The process identification number.
PPID	The PID of the parent process.
Pri	The priority of the process. The lower the number, the higher the priority. System-level processes usually run between 0 and 127. Other processes usually run between 128 and 255. "Nice" processes are those with the lowest priority and will have the largest number.
User Name	Name of the user who started the process.
CPU Util	The first number is the percentage of CPU utilization this process consumed over the update interval. The second number is the percentage of CPU utilization this process consumed since GlancePlus was invoked. I'm skeptical of using GlancePlus, or any HP-UX command, to get data over an extended period. I rarely use the second number under this heading. If you have been using GlancePlus for some time but only recently started a process that consumes a great deal of CPU, you may find that the second number is very low. This is because the process you are analyzing has indeed consumed very little of the CPU since GlancePlus was invoked despite being a highly CPU-intensive process.
Cum CPU	The total CPU time used by the process. GlancePlus uses the "midaemon" to gather information. If the midaemon started before the process, you will get an accurate measure of cumulative CPU time used by the process. To use this column, start the midaemon in the <i>/etc/rc</i> script so that you start gathering information on all processes as soon as the system is booted.
Disk IO Rate	The first number is the average disk I/O rate per second over the last update interval. The second number is the average disk I/O rate since GlancePlus was started or the process was started. Disk I/O can mean a lot of different things. Disk I/O could mean taking blocks of data off the disk for the first time and putting them in RAM, or it could be entirely paging and swapping. Some processes will simply require a lot

RSS Size

more disk I/O than others. When this number is very high, however, take a close look at whether or not you have enough RAM.

The amount of RAM in KBytes that is consumed by the process. This is called the Resident Size. Everything related to the process that is in RAM is included in this column, such as the process's data, stack, text, and shared memory segments. This is a good column to take a look at. Since slow systems are often erroneously assumed to be CPU-bound, I always make a point of looking at this column to identify the amount of RAM that the primary applications are using. Some applications use a small amount of RAM but use large datasets, a point often overlooked when RAM calculations are made. This column shows all of the RAM your process is currently using.

Block On

The reason the process was blocked (unable to run). If the process is currently blocked, you will see why. If the process is running, you will see why it was last blocked. There are many reasons a process could be blocked. Here is a list of the most common reasons for the process being blocked:

Abbreviation	Reason for the Blocked Process
CACHE	Waiting for a cache buffer to become available
DISK	Waiting for a disk operation to finish
DUX	Waiting for a diskless transfer to finish
INODE	Waiting for an inode operation to finish
IO	Waiting for a non-disk I/O to finish
IPC	Waiting for shared memory operation to finish
LAN	Waiting for a LAN operation to finish
MBUF	Waiting for a memory buffer
MSG	Waiting for message queue operation to finish
NFS	Waiting for an NFS request to finish
PIPE	Waiting for data from a pipe
PRI	Waiting because a higher priority process is running
RFA	Waiting for a Remote File Access to finish
SEM	Waiting for a semaphore to become available
SLEEP	Waiting because the process called <i>sleep</i> or <i>wait</i>
SOCKET	Waiting for a socket operation to finish
SYS	Waiting for system resources
TERM	Waiting for a terminal transfer
VM	Waiting for a virtual memory operation to finish

GlancePlus Summary

In addition to the Global screen the CPU, Memory, and Disk screens are most often used. The following screens also exist:

Swap Detail	Shows details on all swap areas.
LAN Detail	Gives details about each LAN card configured on your system.
NFS Detail	Provides details on inbound and outbound NFS mounted file systems.
Diskless Server	Provides diskless server information.
Individual Process	Allows you to select a single process to investigate.
I/O By File System	Shows details of I/O for each mounted disk partition.
Queue Lengths	Provides disk queue length details.
System Tables	Shows details on internal system tables.
Process Threshold	Defines which processes will be displayed on the Global screen.

As you can see, while I described the four most commonly used screens in detail, there are many others you can use to investigate your system further.

What Should I Look for When Using GlancePlus?

Since GlancePlus provides a graphical representation of the way in which your system resources are being used, the answer is simple: see which bars have a high "Avg" utilization. You can then probe further into the process(es) causing this high utilization. If, for instance, you find your memory is consistently 99 percent utilized, press the F3 function key and have GlancePlus walk you through an investigation of which of your applications and users are memory hogs.

Similarly, you may be surprised to find that GlancePlus shows low utilization of your CPU or other system resources. Many slow systems are assumed to be CPU-bound. I have seen GlancePlus used to determine that a system is in fact memory-bound, resulting in a memory upgrade instead of a CPU upgrade.

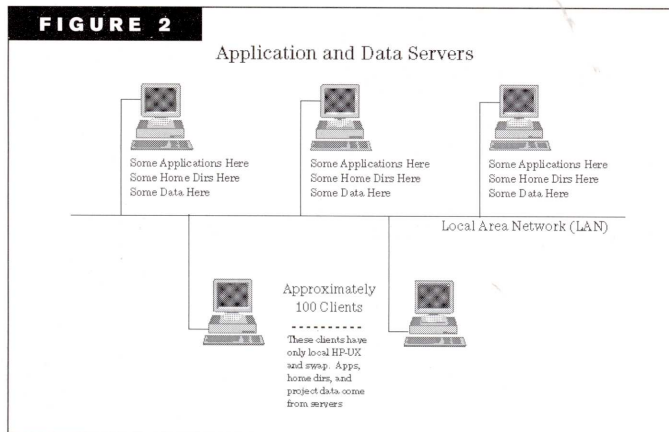
The difference between using GlancePlus to determine the level of CPU resources being used and using the HP-UX commands is that GlancePlus takes out a lot of the guesswork involved. If you are going to justify a system upgrade of some type to management, it is easier to do this with the hard and fast data GlancePlus provides than the detective work you may need with HP-UX commands. GlancePlus is useful for providing this data.

Use the GlancePlus screens to look for the following bottlenecks:

1. CPU Bottleneck

Use the "Global Screen" and "CPU Detail Screen" to identify these common CPU bottleneck symptoms:

FIGURE 2



- Low CPU idle time
- High capacity in User mode
- Many processes blocked on priority (PRI)

2. Memory Bottleneck

Use the "Global Screen," "Memory Screen," and "Tables Screen" to identify these common memory bottleneck symptoms:

- High swapping activity
- High paging activity
- Little or no free memory available
- High CPU usage in System mode

3. Disk Bottleneck

Use "Global Screen," "Disk I/O Screen," and others to identify these common disk bottleneck symptoms:

- High disk activity
- High idle CPU time waiting for I/O requests to finish
- Long disk queues

The best approach to take for understanding where your system resources are going is to become familiar with all of the techniques shown in the earlier diagram. You can then determine which information is most useful to you.

You may need to go a step further with more sophisticated performance tools. HP can help you identify more sophisticated tools, depending on your needs.

A Real Life Performance Problem

It's true that networks "grow a life of their own" over the years. Many of my customers started out 10 years ago with innocent, self-contained, manageable networks that have now turned into monsters. What happened? Well, first the number of computers grew from 10 to 100. Then the number of applications grew from 2 to 20 when other departments started sharing the same network. Then the data used by the applications grew from 5 MBytes to 200 MBytes. Then more sophisticated technology such as NFS became part of the network.

What if you're asked to improve the performance of an application? The application now takes several hours to

complete its run. You are asked to assess the existing system resources (CPU, memory, disk, etc.) and make recommendations of how system resources should be expanded to reduce the completion time of this run. Almost invariably it is assumed that a bigger something (CPU, memory, disk, etc.) is what is required to improve system performance.

Let's walk through the process of improving the performance of a specific computer running a specific application in a distributed environment.

First Things First—Taking Inventory

If indeed your network has grown or you are unfamiliar with the components of the network, the first step is to take an inventory. To begin with you want to know what systems run what applications, where data is stored, and where home directories are located. I like to call this a "functional" inventory. *Functional* in this case means you don't know every detail of every component but you know the flow of data on the network and where it is located. Figure 2 is a greatly simplified version of a real functional network diagram. It is highly simplified because the original just won't fit in *hp-ux/usr*.

This network is set up in such a way that when a user logs in to a client, a home directory is accessed on one of the servers. If a user invokes an application, then the application and project data are copied to the local system. This means that you can expect a lot of network activity initially, but after the application and data are copied to the local system, everything is running on the local system so network activity is low.

This is a simplified network diagram so you can't see the vast number of applications and data spread over these servers. Before we even begin looking at the specific application we want to improve the performance of, you might look at this network diagram and question the amount of redundancy. There are three servers performing basically the same functions. It may make sense to consolidate some of this functionality onto one big server. Having functionality spread over several servers is a characteristic I see when networks have grown over many years. To appreciate the amount of mounting that client systems perform on the server disks, you can use the *showmount* command. The following partial *showmount* output on one of the servers gives you an idea of the number of NFS mounted directories on the server:

```
# showmount -a
hp100.ct.mp.com:/applic
```


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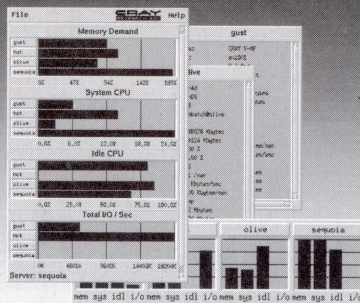
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```

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hp103.cal.mp.com:/applic
hp104.cal.mp.com:/applic
hp109.cal.mp.com:/applic
hp100.cal.mp.com:/usr/users
hp101.cal.mp.com:/usr/users
hp102.cal.mp.com:/usr/users
hp103.cal.mp.com:/usr/users
hp104.cal.mp.com:/usr/users
hp108.cal.mp.com:/usr/users
hp109.cal.mp.com:/usr/users

```

Although consolidating information may indeed improve overall efficiency, the original objective is to improve the performance of application runs on client systems. Consolidating home directories and other such improvements might make system administration more efficient, but there is no guarantee this will improve performance. Instead, we want to characterize the application on the client and see how system resources are being used.

Characterize Application

Since the application is taking a long time to run, we need to find the source of the bottleneck. This can be an undersized CPU, lack of memory, or a variety of other problems. We can start by viewing virtual memory with *vmstat*. The *vmstat*

output shown in *Listing 1* was produced every five seconds a total of 5 times during an application run.

From this example you can see that runnable (“r”) and blocked (“b”) processes are zero, but swapped (“w”) processes are roughly 20 for each five-second interval. This is indicative of a system that has a severe memory shortage. Note also that the active virtual memory (“avm”) is around 10,000 blocks. 10,000 blocks is roughly 40 MBytes:

$$10,000 \text{ blocks} \times 4,096 \text{ bytes per block} = 40 \text{ MBytes}$$

With this amount of active virtual memory and swapped processes you would expect to see a great deal of disk activity. The next logical step is to run *iostat* and see if indeed there is a great deal of disk activity taking place. *iostat* was run five times at five-second intervals to produce the output shown in *Listing 2*.

This looks to be very low disk access as indicated by a low number of blocks per second (“bps”) and seeks per second (“sps”) for a system that has a high number of swapped processes.

The next step is to see how HP GlancePlus/UX characterizes this system. In particular I am interested in the level of disk activity. *Figure 3* is a GlancePlus Memory Detail screen shot of this system.

This GlancePlus screen shot shows data that corresponds to the information *vmstat* and *iostat* provided. Here are some of the pieces of information provided by *vmstat*, *iostat*, and this GlancePlus screen shot:

LISTING 1

```
#vmstat 5 15:
```

procs			memory		page						faults				cpu			
r	b	w	avm	free	re	at	pi	po	fr	de	sr	in	sy	cs	us	sy	id	
0	0	19	9484	91	0	0	0	0	0	0	0	65	84	20	7	0	93	
0	0	22	10253	68	0	0	0	0	0	0	0	214	939	127	72	7	21	
0	0	25	10288	90	0	0	0	0	0	0	9	289	988	152	73	5	22	
0	0	25	10300	89	0	0	0	0	0	0	9	325	820	151	76	3	21	
0	0	24	10298	90	0	0	0	0	0	0	2	139	629	94	94	4	2	

LISTING 2

```
# iostat 5 5
```

			tty		cpu			
	tin	tout	us	ni	sy	id		
	0	1	6	0	0	93		

```
/dev/*dsk/c2076d*s*
bps    sps    msp
2      0.3    0.0
```

			tty		cpu			
	tin	tout	us	ni	sy	id		
	0	73	72	0	5	23		

```
/dev/*dsk/c2076d*s*
bps    sps    msp
17     0.6    0.0
```

			tty		cpu			
	tin	tout	us	ni	sy	id		
	0	97	85	0	4	11		

```
/dev/*dsk/c2076d*s*
bps    sps    msp
1      0.2    0.0
```

			tty		cpu			
	tin	tout	us	ni	sy	id		
	0	66	87	0	3	10		

```
/dev/*dsk/c2076d*s*
bps    sps    msp
2      0.3    0.0
```

			tty		cpu			
	tin	tout	us	ni	sy	id		
	0	55	7	0	5	22		

```
/dev/*dsk/c2076d*s*
bps    sps    msp
5      1.2    0.0
```

- The CPU utilization is around 90 percent as reported by *vmstat*, *iostat*, and Glance.
- Memory utilization is almost 100 percent.
- Active virtual memory is over 40 MBytes as reported by *vmstat* (remember the 10,000 blocks \times 4KByte blocks) and GlancePlus (the GlancePlus results are somewhat higher because I opened up several additional windows in HP VUE).
- Disk activity is 0 percent as reported by both *iostat* and GlancePlus!

This is becoming somewhat of a puzzle. If there are a lot of

swapped processes and a high level of active virtual memory, where is the massive disk activity we expect? As it turns out *netstat* helps solve this problem.

At this point the system should be running its application and not relying on other systems for resources. You may recall that both the application and data have been copied to the local system, so there is no need for other systems to play a part in this application run. As it turns out, however, *netstat* tells us otherwise. The following *netstat* example was obtained while the application was running:

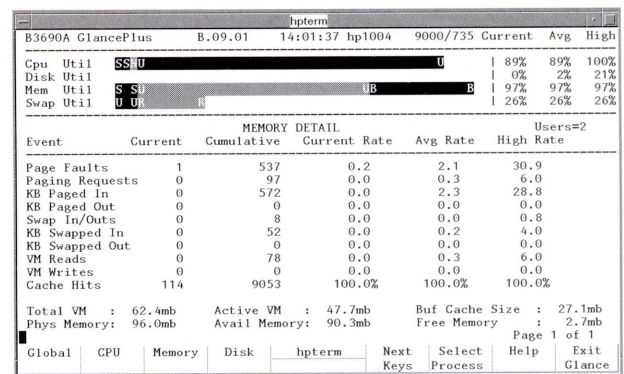

```
#netstat -I lan0 5
```

input		(lan0)	output		
packets	errs	packets	errs	colls	
8792739	120618	106184	0	1522	
425	5	383	0	3	
220	0	191	0	1	
352	1	191	0	3	
439	1	380	0	1	

This output shows that every five seconds there are around 200 input packets and 200 output packets at this network interface. That is a substantial amount of network traffic for a system that should be running in stand-alone mode at this point.

This network traffic is caused by the vast amount of virtual memory activity taking place across the network. The application uses the user's home directory as the default location for working files. Since the functional inventory showed the user's home directory on one of the servers and not the local system, we have an explanation for the lack of disk access on the local system and the high level of network activity on the local system. The fact that local swap is not being used on the client is further reinforced by the *swapinfo* example from the client in the box below, which shows that only 4 percent of the swap space on the client is being used.

FIGURE 3



The only remaining piece of the puzzle required to confirm that the server is being used for virtual memory is to run some of the same commands on it. Since it is not an HP system, I chose to run *netstat* on it to see if indeed there was a great deal of network activity on the network interface. I found the numbers to be almost identical to the level of network traffic being generated on the HP client.

By using a swap device local to the client you would expect the run time of this application to be greatly reduced. When this was done, an example run went from six hours to one hour. We have achieved our goal of greatly reducing the time of the application run without changing the system configuration! ■

Marty Poniatowski is a technical consultant with Hewlett-Packard. He is author of The HP-UX System Administrator's "How To" Book and HP-UX 10.x System Administration, published by Prentice Hall, which can be ordered by calling 203-377-4746.

```
#swapinfo
```

	Kb	Kb	Kb	PCT	START/	Kb			
TYPE	AVAIL	USED	FREE	USED	LIMIT	RESERVE	RI	NAME	
dev	204505	8401	196104	4%	820534	-	0	/dev/dsk/c201d6s0	
hold	0	30724	-30724						

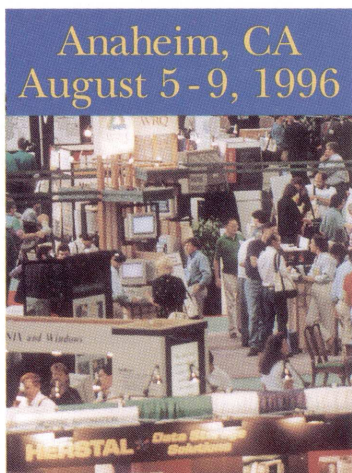
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HP-UX Systems Administration

by Chris Curtin

Security

SECURITY SHOULD BE THE most important job of a System Administrator. Keeping the computer systems running is just as important, but if you cannot be sure who your users are, or worse who has root permission, the validity and usefulness of the computer systems become suspect.

In this column I will discuss only the tools that come with HP-UX 9.0X. HP-UX 10.0 contains some additional tools, but I haven't had enough time to work with them to give a good evaluation.

The first step in securing a system is to know who your users are. To do this you need to fill in all the 'optional' fields in the password entry for a user.

The four fields to require are:

Real Name

Office Location

Office Phone

Home Phone

These fields are modifiable using SAM and following the "Users and Groups->Users" path. Having this information up-to-date enables you to identify who is logged in and gives you a contact phone number if you identify suspicious activities and want to contact the 'real' user to verify his or her intentions.

One thing you will notice when in the Users view: there is no place to define password aging. Password aging is a method of forcing a user to change his or her password at a fixed interval. To activate password aging, you must edit */etc/passwd* by hand and activate it on a per user basis.

A sample */etc/passwd* entry is:

```
chris:password,factor:310:20:Chris Curtin,BWI Atlanta GA,\npar (404)256-4855, (404)256-4855:/users/chris:/bin/ksh
```

The first field is the user's name. The second field is the encrypted password. After the password is a password aging factor. This forces the user to change his or her password after a set period of time. There are three fields in the aging factor. The first is the maximum number of weeks that a password can be used. The second field is the minimum time that a user must use a password before changing it. The final field is the number of weeks since January 1, 1970 when the password was last changed. All fields are encrypted but the first two follow a simple encryption method.

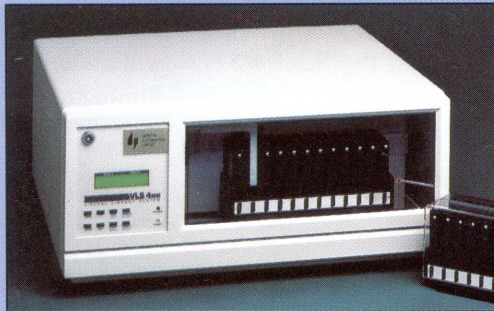
For 0 weeks a period (.) is used. For one week a slash is used (/). For weeks two through eleven the numerals 0 through 9 are used. For weeks twelve through thirty-seven the uppercase alphabet is used and for weeks thirty-eight through sixty-three the lowercase alphabet is used. You can force the user to enter a new password at the next login by setting the aging factor to two periods (..). If you set the minimum time greater than the maximum, then only the system administrator can change the password.

To edit the password file, log in as root and execute */etc/vipw*. *vipw* is a special version of the vi editor that locks the password file and does not allow any changes to it, then loads */etc/passwd* into the buffer for you to edit. After making the changes (remember you must make the change for all users), save the file and exit. The

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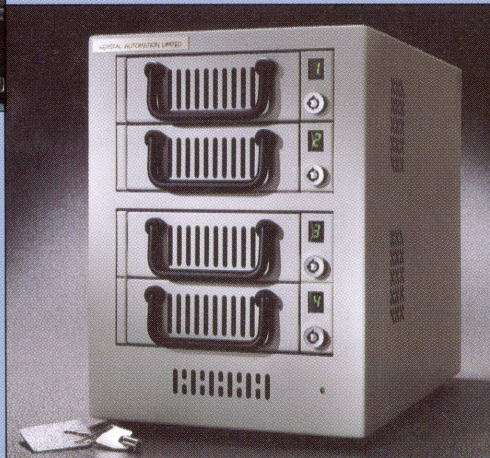
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new password file is installed and used.

Since *vipw* locks the password file, I strongly recommend you do use it during light system usage or when the system is down for maintenance.

Now for a couple of problems with HP-UX 9.0X's password aging: First, while */bin/passwd* will not allow a user to enter the same password twice in a row, it cannot force a user to use a new password at each change. Second, there are no limits placed on what can go into a password. A user can use a password of 'a' now and change it to 'b' later. HP-UX 10.0 addresses these issues.

Restricting Root Logins

After you have identified who your users are, it is time to lock down the root user account. The first step is to identify which of your users must have root access and why. If you have a very large list, or some of the users need access only to specific commands, consider using *sudo* or similar public domain software that allows you to give root permission to specific users to perform specific tasks. Check out the HP-UX FTP sites such as <http://hpux.cae.wisc.edu>.

The next step is to force direct root logins to occur only on the system console. This policy allows only users who have access to the system console to log in as root without going through a normal account. Logging in as a normal user, then *su*'ing to root will work, but *rlogin* as root will not.

The file used to enforce this policy is */etc/securetty*. The contents of this file are very simple: The name of the *ty*/*pty* from which a user can log in as root without already being logged in. Each *ty*/*pty* must be on a separate line and must not contain the */dev/* before it. For example if I wanted root to be able to log in from the console and from a modem the file would contain two lines:

```
console
ttyd0p1
```

Creating the file with no *ty*/*pty*s in it prevents root from logging in anywhere without first logging in as a normal user. This creates and enforces a policy of requiring two passwords before gaining root access. Make sure you make the permission 400 and owner root on */etc/securetty* so no one else can modify it or see its contents.

Now no one can log in as root unless he logs in on the console or dials in on the modem connected to */dev/ttyd0p1*. In

the case of the modem line, additional security can be added to ask for another password on login. I'll address dialup passwords a little later.

X Windows and /etc/securetty

Guess what, HP-VUE and XDM ignore the */etc/securetty* file. To prevent or restrict root access using VUE and XDM, you must modify some configuration scripts.

For XDM you must modify the */usr/lib/X11/xdm/Xsession* script. Near the top of the file add lines like the following to totally prevent root login:

```
if [ $USER = root ] ; then
    exit 1
fi
```

To restrict root login to a specific terminal add lines like the following:

```
if [ $USER = root ] ; then
    if [ ! $DISPLAY = okayDisplay ] ; then
        exit 1
    fi
fi
```

The first example exits if the user login is root. The second example checks if the user root is logging in on display 'okayDisplay' and exits if not.

For HP-VUE you put similar commands in the */usr/vue/config/Xsession* file.

Dialup Passwords

Dialup passwords are another level of security that require a user to know two passwords before dialing into the system: his or her own and a systemwide password.

The systemwide password is defined on a login program basis. Thus all users of */bin/sh* can have a password different from that of the */bin/ksh* users. This is useful if your only Bourne (*/bin/sh*) user is root; however, most of the time the dialup password is identical for all shells.

The first step in defining dialup passwords is to determine which *ty* devices will have modems and dialup passwords associated with them. This will depend upon your system. On mine we use */dev/ttyd0p2* and */dev/ttyd0p7* for dialup modems and I want passwords on each line for all users.

Next edit the file */etc/dialups*. If it does not already exist,

create it. In this file add an entry, one per line, for each device that you want to have dialup passwords for. My */etc/dialups* looks like this:

```
/dev/ttyd0p2  
/dev/ttyd0p7
```

Next create the file */etc/d_passwd*. Add the following line to it:

```
/bin/sh::
```

The two colons are important. Between them is where your dialup password will be encoded. If you want different passwords for each shell type, add a line to the file for each shell.

Now, as root, run *passwd* on the file to set the dialup password. For example, to set the dialup password for Bourne Shell users execute the following:

```
passwd -f /etc/d_passwd /bin/sh
```

You will be prompted for the new password and asked to verify the password. If you are using different passwords for each shell, execute the command once for each shell, changing the last parameter to be the shell name.

If you are using one password for all shells, edit */etc/d_passwd* and copy the line for */bin/sh* and change the *'/bin/sh'* to the name of the login shell.

Now that you have dialup passwords installed, a user dialing in will be prompted for a login name, login password, and dialup password. If any is incorrect, the user is prompted again from the beginning. Thus a cracker needs to know three pieces of information to infiltrate your system via modem.



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/.rhosts and /etc/hosts.equiv

One other area of security you must be aware of is the backdoor access provided by */etc/hosts.equiv* and a *.rhosts* file. Both of these files allow a user to log in to another system without providing a password. The basic format of both is:

```
hostname username
```

If the hostname/username pair matches on both new destination computer and source computer, a user does not need to have a password to log in on the destination computer. This is a huge security hole because once a computer is "cracked" the cracker can add an entry to */etc/hosts.equiv* that allows him to log in as root from his server on demand. Even if the root password on the violated machine is changed, if */.rhosts* or */etc/hosts.equiv* is not checked, the door is still open.

Look at the man pages for *hosts.equiv(4)* for more information, since I could (and may!) write an entire column about its dangers.

That's it for this time. As always, keep the e-mail comments and suggestions coming. Also I am looking for HP-UX or system administration mailing lists and Web sites to check out. If you have any suggestions, I'll check them out and mention them in a future column. ■

Chris Curtin, a software developer for Bradley Ward Systems, Inc. in Atlanta, Georgia, specializes in device driver development for factory automation on the HP 9000. He can be reached via e-mail at: chris@bwilab3.att.ga.us.

by David L. Totsch

Swiss Cheese Files

WOULD YOU LIKE A NICE Swiss Cheese File to go with your Spaghetti Programming? Probably not. Well, actually, the metaphor stops at the foodstuff names: spaghetti programming is something to be avoided, but files with holes in them actually have a use. HP-UX, just like all of the other Unices, sees just about everything as a file. And a file is loosely defined as a stream of characters. That is a simple view of how files work, but it takes you a long way down the road of understanding how HP-UX works.

Knowing that a file is merely a stream of bytes, you expect the number of bytes listed by `ls -l` to be in agreement with commands that list the number of 512-byte blocks a file occupies. But, take a look at this Sybase TEMPDB file:

```
# ll P01_TMPDB00
-rw-rw-rw- 1 sybase sybase 260046848 Sep 13 12:03 P01_TMPDB00
# ls -ls P01_TMPDB00
310624 P01_TMPDB00
# expr 260046848 / 512
507904
# du -s P01_TMPDB00
310624 P01_TMPDB00
```

Is the `ls` command lying to us? It is reporting that the file is taking up fewer blocks than would be necessary to hold the number of characters listed. But, `du` is reporting the same number of blocks. Although there are advocates of compressing file systems, 260,046,848 characters are not being stored in 310,624 blocks. The file we are looking at is a sparse file.

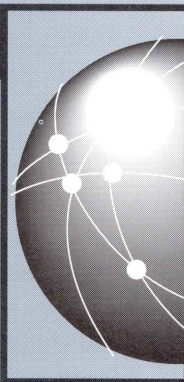
A sparse file, because it is not completely populated, looks just like Swiss cheese. Similar

LISTING 1

```
#include <fcntl.h>
#include <unistd.h>
#include <sys/types.h>
main()
{
    int F;
    F=open("file1",O_WRONLY|O_CREAT,S_IRUSR|S_IWUSR);
    write(F,"x",1);
    close(F);
    F=open("file29999",O_WRONLY|O_CREAT,S_IRUSR|S_IWUSR);
    write(F,"X",1);
    lseek(F,29999,SEEK_SET);
    write(F,"X",1);
    close(F);
}
```


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UNIXREVIEW

CIRCLE 125 ON READER SERVICE CARD

**Sys
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to Swiss cheese, sparse files have holes because of how they are made. We know that the *lseek()* system call will go straight to a byte in a file to position for reading and writing. In a database application, that position can be derived as a hash of the data (to make accessing the data faster, you cal-

culate a position rather than perform a sequential read until the data is found). If you open a new file and seek out to a byte and write that byte, what happens to all of the bytes you passed over? When you cat the file, you see nulls, but, when you look at the file's inode, you see that the blocks to

hold the data were not allocated. To illustrate, I wrote the short program in *Listing 1*. The program creates *file1* and puts an *x* in it. It then creates *file29999*, puts an *X* in the first byte and then seeks out to 29999 and writes another *X*. Take a look at the output in the box below.

```
# ll file*
-rw----- 1 root sys 1 Oct 19 15:09 file1
-rw----- 1 root sys 30000 Oct 19 15:09 file29999
# ls -s file*
 2 file1 28 file29999
# du -s file*
2 file1
28 file29999
# od -c file29999
0000000 x \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0
0000020 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0
*
0072440 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0 \0
0072460
```

This shows us that the program was successful in creating what appears to be a sparse file. I used *od* to display the file because it automatically recognizes the repetition. You can use *cat -v* if you are patient enough to watch 29998 nulls fly by.

To emphasize further the point that

the blocks are not allocated, let's take a peek at the files' inode.

WARNING: *fsdb* (the file system debugger) is NOT for the faint of heart. The light feeling you have subsequent to pressing Enter when having typed the command is not giddiness at using a

rare and complex HP-UX command; it is your guardian angel rushing off to request reassignment to a human with a functioning brain.

In the box below, we see the inode information for *file29999*. The information in *a0-a14* is the data block

```
# ls -i file*
12349 file1 12350 file29999
# /etc/fsdb /dev/vg01/rlvol5
file system size = 204800(fragments) isize/cyl group=256(Kbyte blocks) primary block
size=8192(bytes)
fragment size=1024
no. of cyl groups = 19
12350i
i#:12350 md: f---rw----- ln: 1 uid: 0 gid: 3 sz: 30000 ci:0
a0 : 65824 a1 : 0 a2 : 0 a3 : 66218 a4 : 0 a5 : 0
a6 : 0 a7 : 0 a8 : 0 a9 : 0 a10: 0 a11: 0
a12: 0 a13: 0 a14: 0
at: Fri Oct 20 13:29:28 1995
mt: Thu Oct 19 15:09:45 1995
ct: Thu Oct 19 15:09:45 1995
```


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CIRCLE 164 ON READER SERVICE CARD

information we expect to see. Note that a0 is populated with a block number as we would expect (since we wrote an X into the first byte). Then, a data block is not allocated until you get to a3, where the other X at 29999 is located—further proof that physical disk space was not allocated to hold our two bytes.

What happens to all of this unallocated space if you copy a sparse file? If you use *mv*, there is nothing to worry about because a move affects only the directory information (unless the destination directory is on another file system). If you copy the file with *cp*, ugly things happen:

```
# cp file29999 junk
# ll junk
-rw-r--r-- 1 root sys 30000 Oct 19 15:10 junk
# du -s file29999 junk
28 file29999
60 junk
```

Yikes. The holes in the sparse file were filled in. You need to deal with sparse files carefully. *Tar*, *cpio*, and *fbbackup* will all exhibit the same behavior.

Since a sparse file is going to grow when it is copied, what other files are known to be sparse? The one you would have to worry about is one that you are probably already tracking down and dealing with: core files. When a core file is created, there can be a gap between the data and the process execution stack. This gap manifests itself as a hole in a sparse file.

All that remains is to explain why *du* reports that there are 28 blocks in use instead of 2. I will leave that as an exercise. Here are a couple of hints, though: *du* reports in the number of 512-byte blocks and the file system used has 8K blocks and 1K fragments. ■

After serving several different organizations over the past seven years as a system administrator with various flavors of UNIX, David L. Totsch still enjoys the profession. He also enjoys discussing UNIX with just about anyone. At present, he is working with HP-UX systems and wide-area networks for a Fortune 100 company in the Piedmont area of North Carolina. He can be reached via Internet: dtotsch@ufu.edu.

by Lisa Zahn

THE SUBJECT OF THIS ISSUE's site profile is Systems Engineering Support Services (SESS), the organization that manages Mentor Graphics Corporation's engineering campus.

We spoke with Larry Breniser, manager of the file server administration group, and George Rich, team leader for building administration.

SS: How is your support organization structured?

Our organization is part of Mentor Graphics engineering, and we're responsible for administering engineering's UNIX environment. Our organization is divided into four support groups: hardware, file server, network applications, and building administration. Each of these groups is set up to provide 24-hour support. We have 17 support people for 700 users on site.

Mentor also has an information services organization, "IR," that handles all business computers, the local area network, and the wide area network. IR owns the wire plant, the routers, bridges, and so on. We think "IR" stands for "Information Resources," but we're not sure—they're on their third set of acronyms.

SS: What administrative areas do you support?

We provide hardware and general operating system support for all the engineering machines—if it's not a Mac, we handle it. We act as the sole vendor for hardware support whenever it makes sense. For example, if a user has a problem with a mouse, we give them a new one, then send the bad one in.

We also manage the NIS and file server environment, and provide

support for local news and mail delivery.

IR ensures that mail gets to the site; we ensure that our users can read it. We run backups, and we handle the printer/plotter queues.

Our group is also responsible for installing layered applications, but only if they're approved by engineering's Platform Environment Team, or "PET." PET selects the development tools that the engineers use; this process applies to Mentor products as well as third-party software. If PET approves an application, we'll set it up. We also manage all software licenses, including licenses for Mentor products.

Once they're installed, we share support for third-party applications with other groups that belong to the same higher-level engineering organization we're in. For example, we may do direct troubleshooting for a third-party application, but another group will handle the vendor issues. However, we don't touch Mentor products once they're set up, aside from managing their licenses. We support the environment in which they're built and run, but if a user has a problem with a Mentor program, he either tracks down someone in the group that developed the application, or calls Mentor customer support.

We provide unofficial support for public domain utilities: whoever contributes a software package gives us a name and phone number, and we call them if there's a problem with the package.

We share some aspects of network and security support with IR. For example, IR supports the physical network topology, but we work with IR as necessary to support logical network usage, balance, and configuration. We provide user data security to the level of

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managing group and user IDs; IR maintains the firewall. Our group supports an e-mail-based help system, but we don't "man" a phone—IR does that. The typical day-to-day help mechanism is for a user to send mail to "help," which we support. If a user calls IR, they page us if it's a UNIX problem.

SS: Do you distinguish between operations and analysts/engineering functions?

To the extent that "operations" means the business side of things, we do. IR handles the business machines (Macintoshes now, but they're moving to PCs). We handle the UNIX engineering platforms.

SS: What applications are run in your environment?

We run a lot of our own tools, which are EDA, as well as the standard engineering software development tools. There are ORACLE and Sybase databases around, but IR maintains them. FrameMaker is our word processor of choice.

SS: What kind of computers and operating systems do you support in your environment?

We support a pretty much even mix of HP (HP-UX) and Sun (SunOS) systems for our engineering platforms. Our "second-tier platforms" include some RS6000s and DEC Alphas, and a few NECs are still around. We have 7 AUS-PEX machines, 10 SPARC10 Suns, and 2 HP Series 800 machines that we use as file servers. We also have 3 HP 800s that we use as news servers.

And we still have Apollos—DN3000s or better—kicking around. 90 percent of these machines are used for source code or patch builds; the remaining 5

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to 10 percent are used for running applications that convert old designs to new designs.

SS: What's a typical desktop system in your environment?

Mentor is the home of CAD/CAM software, so the typical desktop is a big machine. If a user doesn't have at least a SPARC10 or HP Series 735 CPU with 64 MB of memory and a 19-inch super color monitor, he'd like to upgrade. We also have a fair number of 755s, and SPARC20s are becoming the rule.

SS: Do you support non-workstation platforms on the desktop?

We have a couple of X terminals, but X and dumb terminals are generally not appropriate for our environment. Macintoshes represent the "business" platform, and aren't part of engineering. We are, however, struggling towards integrating PCs into our engineering environment.

SS: Does your environment use central file servers and compute servers for shared resources or is your environment widely distributed?

Our current strategy is "local network access to centrally located file servers." We logically place file servers on the same network as the machines using them, and we try to minimize people using the backbone. As a general rule, everything, including home directories, is on the file servers, although there are people who've set up their own environment. We encourage our users *not* to store locally and we discourage them from asking us to back up their local storage—we encourage them to put their data on the file servers because they are the machines that are reliably backed up. As

for compute servers, there are divisions that have them, but there isn't a central strategy. We started down that road a while ago, but it never panned out.

SS: What's your printer environment like?

We use centralized network printing, for the most part. We spool to five print servers. Each printer is connected to the network just like the desktop systems. All the desktops feed into these five print servers. We use the UNIX *lp* spooler to manage the printer queues.

Centralized printing makes troubleshooting a lot easier; you don't have to figure out which desktop sent the print job, because the job always goes through the same systems. There are some desktop stations with printers attached, but these are special cases. There's also a printer/plotter group that has a special set-up for their needs, but they take care of their own environment.

SS: What does your network look like?

Each office has RJ45 Grade 3 and fiber; most systems are on RJ45. The office wiring runs to central hubs on each floor, and from there to concentrator cards, which feed into switched bridges. The bridges are connected with fiber, and fiber runs between buildings. We use shared 10MB/s Ethernet from the bridges to the offices, and 100MB/s FDDI network connections between bridges and between buildings. Multiple file server connections run back to bridges, which run 10baseT to routers, NIS servers, and print servers. We use this configuration to extend the physical network to a building that needs server resources. Logically, the

desktops and servers are on the same network, but physically, they're in different buildings.

The Apollos are also part of the network, the machines are connected with fiber into a token ring, which connects to a concentrator card in a hub. The hub connects to a router that translates to Ethernet.

We do have an "open subnet" on campus that connects to a T1 line for Internet connectivity, but communications through this subnet are tightly controlled.

SS: How do you authenticate your users on your networked computers?

We use the Domain/OS registry for the Apollos, and we've built a customized NIS environment that handles everything else (even the Domain registry is fed from NIS). We're not heavily into password security, partly because our users feel that too much security gets in the way, and partly because we have a very strong firewall.

SS: What's your backup strategy?

We do one full backup and four incremental backups per week; Friday, Saturday, and Sunday count as one big "day" in our work week. We use Omni-back to back up the Apollos, and home-grown backup programs for our UNIX and file server machines, but we're looking at third-party network-based UNIX backup solutions for the future. Except for the Apollos, we use an 8mm tape stacker, and we're moving towards DLT.

SS: What communications services do you support between your users and between your users and their associates?

Internet communication is one-way, except for e-mail and ftp to one of our

anonymous ftp servers: you can originate communication within Mentor, but you can't come in to Mentor from the Internet. For example, you can go out with WWW/Mosaic, but not in. Mentor has public http sites, but they're not on our network; so, for example, the Mentor home page is not on the Mentor Graphics network. People can also post news—we purchase a news feed from our Internet Service Provider.

For dialup/modem access, we had a callback system, but we phased it out. Now we're going to remote access with PPP and a secure ID card with possibly a callback system.

For internal mail, Mac users use QuickMail, and UNIX desktop users use UNIX mail. It's unclear right now what the PC mail strategy will be. IR is using Zmail and reading mail with POP, but engineering is not heading in this direction.

We support zillions of site aliases for users and groups; every little Apollo mail alias—like mentor.frisbee—has been converted to UNIX. ■

Lisa Zahn is vice president of Ibis Communications Inc., a technical documentation and training consulting firm. She was one of the first five technical writers at Apollo Computer, Inc. and was a Learning Products manager at HP's Chelmsford, Massachusetts facility for several years before forming Ibis.

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CIRCLE 184 ON READER SERVICE CARD

by Larry Headlund

Shell Games

GUI INTERFACES SHOULDN'T BE only for big projects and C/C++. The ease of use, internationalization features, standardization, and consistency of a GUI are just as important for small, specialized applications as for the big bet-the-business programs. Maybe more so. After all, the big application is probably one that is used everyday and a user can adapt to the program, if need be. In fact, if the application is heads-down entry input, speed may be more important than anything. But what justifies the effort on a small application?

Another reason to use a GUI toolkit from a programmer's seat is that they are toolkits, collection of tools. After you get used to passing the work of adding and deleting items from a list, presenting range of choices, or selecting some but not all to a toolkit, it is frustrating to have to handcraft a solution yourself. Add to this the certain knowledge that you are hardly advancing the art of computer science, recoding what has been coded countless times before.

And who says the project is small? I have written a lot of big, central programs in scripting languages because I felt they were the right tool for the job. Shell scripts have been written that implement complete relational database management systems, full-blown accounting systems, and just about any other project you can imagine. While some of these efforts evoke the same reaction as a dancing bear, where the wonder is not how well it dances but that it dances at all, I think most are good solid pieces of work.

I am not the first to make these observations. There are many scripting or interpreted language and GUI toolkit marriages. I will mention the phenomenally successful Microsoft Visual Basic

only in passing, since this is an X column. (I have heard of a port of VB by a third party to the UNIX/X/Motif world, but I haven't yet had a chance to try it out.) The list of GUI and scripting languages starts with Smalltalk, continues through Winterp, the Lisp interface to Motif, includes Tcl with its links to both Motif and Tk, a toolkit by the same author, John Ousterhout (notice that Tk turns up again in an interface for Perl), dtksh, the artist formerly known as the Windowing Korn Shell or wksh, Python, xtent, and Elk. This is not a complete list.

Why I Rolled My Own

Good programmers use the work of others. So why was I writing C code when there was so much good work already done? Part of the reason had to do with some special requirements. I wanted to use my favorite GUI tool, Wcl. (If you're not a Wcl user, fear not, the techniques are extensible to other tools.) While I like learning computer languages (I'm strange in other ways, too), I would be handing this work off to be maintained by others who don't share my tastes. I needed a basis language that was as powerful and as widely known as possible, a greatest common denominator. This led pretty directly to the Korn shell. While Tcl and Perl are as widely available, the Korn shell was what everyone knew. And shell scripts are what we have traditionally used for simple front ends. An even more compelling reason is that the applications I was initially looking at were already implemented using the Korn shell. I wanted to avoid fiddling with code that worked, whenever possible. As it turned out, my latest solution would work as a front end to Perl, awk, or whatever. A simple front end—that is, emphasis *simple*, emphasis *front*.

Continued on Page 68

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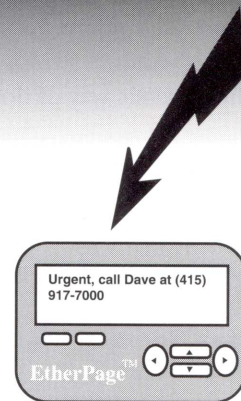
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LISTING 1

```

/*
A callback function for adding items to SelectionBox
List from the Text field:
*/

void selectionBoxAdd(
Widget widgetSelection,
caddr_t      unused,
caddr_t      ignored)

Widget widgetList = XmSelectionBoxGetChild(
                                widgetSelection,
                                XmDIALOG_LIST);
Widget widgetText = XmSelectionBoxGetChild(
                                widgetSelection,
                                XmDIALOG_TEXT);

char* strValue = XmTextGetString(widgetText);

if((strValue) > 0) {
    XmListAddItem(widgetList, strValue, 0);
}
}

```

One already implemented approach of integrating GUIs and the Korn shell wouldn't work for me. That is the approach taken by Jan Newmarch with his XScript (<ftp.canberra.edu.au/pub/motif/xscript>). It is based on calling small, single-purpose GUI programs from a shell script, for example, to get a text value, a string, in response to a prompt. The Korn Shell Classic way of doing this is

```

echo "What is your sign?"
read response

```

The XScript way of doing the same thing is

```
response=`xprompt What is your sign?`
```

This displays a simple dialog window and returns the input value. XScript has wrappers like this for message boxes of various types, file selection, selection from a list, and others. So what's wrong with that? Nothing, but what I wanted to do required the user to make choices from a list, add and delete items from a different list, and enter the number of copies desired. This would be somewhat repetitive, in that there would be minor changes in the data and the same action repeated. So I wanted to preserve the choices made previously. This was not easy or natural with XScript. I also worried about the overhead of repeatedly invoking a number of dif-

ferent GUI programs. I am afraid that this concern for wasting machine cycles dates me.

If I wanted to do windowing programming in the Korn shell, why didn't I use the dtksh, or Windowing Korn Shell, by Steve Pendergast? The short answer is that I needed the program now, this week, and the dtksh, and the rest of the Common Desktop Environment from the COSE Initiative, will not be available from HP until the end of 1995 or the beginning of 1996. It may be overkill for simple projects, but we shall see.

Defining a Solution

What I wanted was a front-end to a database query. I wanted the users to choose from one list, which determined the pricing, enter a number, and input an indefinite number of SKUs. I would use this input to write an SQL script that would be run with the output sent to some already written reporting programs, the end result of which would be the printing of some labels. I wanted the user to be able to repeat the actions with small changes.

The widget structure would be a MainWindow containing a MenuBar and a SelectionBox in the WorkArea.

The MenuBar Help button would manage a MessageBox with a description of the program and instructions.

The File menu would contain the Exit key.

The SelectionBox List and Text would be used for adding SKUs.

The Ok button would say Add and would add SKUs to the SelectionBox list.

The Apply button would say Delete Selected and would do just that, removing any SKUs that had been selected by the usual methods.

The Cancel button would say Clear and would remove all SKUs from the list.

The Help button would say Print and do the work of constructing the SQL statement and invoking the print program.

SelectionBox can have a child widget. The one I create is a Form widget that contains a text widget for the number of copies, a List widget with the pricing options, and Labels for each.

Constructing the Code

I need to add some functionality to the Wcl toolkit. My requirements say I have to add to the List of a SelectionBox from the Text child of that widget. This is a straightforward function (see *Listing 1*), considering it is turning the

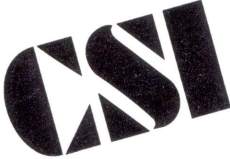
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CIRCLE 111 ON READER SERVICE CARD

functionality of a SelectionBox, which is to present a value from a list, on its head. Make this the nomatchCallback and set the selectionPolicy to MUST_MATCH and you're in business.

This is mechanics. The key question is, How do we interact with the shell? I had some principles at work here. I wanted to keep the presentation layer, the GUI, as distinct from the other layers as possible. I wanted to write as little code as possible, to minimize the testing and debugging I would have to do. And I wanted solutions as general as possible.

I mentioned I was using Wcl. Wcl lets you specify widget creation and callbacks in resource files, much as you specify strings and default values. The key feature in what follows is that Wcl passes the argument of the function in the resource file as the second argument to the callback. For example, if you wrote in a resource file

```
*.thiswidget.okCallback: myfunction(hello there)
```

the function *myfunction(Widget w, char* s, caddr_t unused)* would have as its first argument the widget this widget and the second argument, *s*, would equal "hello there". What you do with these arguments is your own business.

Wcl comes with some shell interface functions built in. In particular, it has one called *WcSystem()*, which executes a system call from its argument. For example,

```
*thiswidget.activateCallback: WcSystem(date)
```

would echo the date to standard output when a button was pressed. This is fine for implementing a simple menu system, but I needed, at a minimum, to pass values from Text, SelectionBox, and List widgets to a shell.

The details on this will be the subject of my next column. ■

Larry Headlund is the president of Eikonal Systems, a UNIX and Motif development company and has been working with commercial UNIX since 1983 and with X since 1987. He can be reached at lmh@world.std.com or at 1.617.482.3345.



HP 1000 Guru

Q: I have just installed my 6.2 RTE-A update and I am getting the following error on my 12040D mux console:

IO Device error on LU 1
Reason is: Illegal request
Request has been flushed

I did not make any changes to my mux configuration or welcome file. What is causing this?

A: The 12040D mux driver changed at 6.2 and this change is apparently incompatible with older D mux firmware. The solution is to replace the 12040D mux firmware with the latest 5.22 revision, part number 5181-8682. This problem has been seen with Revision 5.02 and older firmware. This is a good time to remind folks that they should check firmware revisions at least at each update to see if anything important changed. In this case, the behavior went unnoticed on most systems because they had current firmware. But many systems may have older firmware that may not be compatible with newer versions of the operating system. Chapter 3 of the RTE software *Communicator* contains revision information for both software and firmware.

Q: I am using an NS/1000 system as a gateway between two LAN networks. I find that some systems cannot PING across the gateway. This worked before and the only change was updating to 6.2. Did something break?

A: Unfortunately, yes, something did break. It turns out the gateway machine has a problem with IP addresses of the form:

xxx.xxx.000.xxx.

The problem was traced to an error in the code that checks the IP address in order to determine which network to forward the packet to. The 000 in the third byte was being misinterpreted as an invalid address and the gateway would then drop the packet.

A patch is available from the Response Center for this and other 6.2 problems.

Q: For years I have been frustrated by PROMT and CM. PROMT is hardcoded to run at priority 3, which is high enough to interfere with some of my real-time high-speed data collection. PROMT also schedules CM at a priority of 2, which aggravates the issue even more. Is this being looked at?

A: Looked at and fixed! As of 6.3, you will be able to alter the priority of PROMT (and also CM) at link time. And the priority will stay that way.

To change the priority of PROMT, RP it and set its priority with the PR com-



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LISTING 1

```

FTN7X,L,s
*
*   Program to reset DVT20 to 77b (Character mode)
*   We simply obtain the address of DVT20 for the
*   given LU and write a 77B in that location in memory
*
      program reset_port
      implicit none
$alias /luta/='$LUTA',noallocate
$alias crossload='.XLA',direct
      common /luta/luta
      integer lu,dv20,lutbl,Address_of_dvt,addr
      integer luta,CrossLoad, AddressOf,ixget,ixput
      integer iftty,int
c Ask for terminal LU to reset
      write(1,*) 'Enter terminal LU:_'
      read(1, '(i3)') lu
      int = iftty(lu)
      if(int.eq.0) then
          write(1,*) 'LU not interactive'
          goto 999
      endif
c get address of lu table
      lutbl=crossload(luta)
      Address_of_dvt = ixget(lutbl+(lu-1))
      dv20 = ixget(address_of_dvt+19)
      write(1, '( "Value of DVT Word20 is ",o6)') dv20
      addr = (address_of_dvt+19)
      write(1,*) 'Setting DVT20 to Octal 77 - Character Mode'
c Note: IXPOT is undocumented and unsupported
      call ixput(addr,77b)
      write(1,*) 'Done!!'
999 continue
      end

```

mand in the welcome file. Alternatively, you can use the LINKLK command to reset PROMT's priority permanently. This sets the priority of PROMT and indirectly, also CM. When PROMT schedules CM, it gives CM a priority one higher (one lower numerically) than its own. So if PROMT is running at a priority of 10, it will give CM a priority of 9.

This is recommended only if you need to lower the priorities of PROMT and CM for real-time considerations. In most cases, it is important for PROMT and CM to have high priorities so that they can interrupt processes

and allow user control.

If you want a pre-6.3 version with these changes, contact the Response Center.

Q: I am using a block mode application for most of my user terminals. On occasion, one of the users will disconnect from the system without exiting the application, thus leaving the terminal port in block mode. I cannot get the terminal port reconfigured to line mode so that other users can log on to that port. Is there a way to set a disconnected port back to line mode?

A: The usual way to reset a mux port to character mode is to use the *HpCrtCharMode* call. The way this call works is as follows: First the proper escape sequence is sent to the terminal to put the terminal into character mode. Next, a driver control request is issued to read the terminal straps, and set the driver to match the terminal straps. *HpCrtLineMode* and *HpCrtPageMode* behave similarly. The problem is these calls require that a terminal be connected for them to work successfully.

Note that these calls work on both 12040 mux ports and TELNET pseudo LUs.

If you really want to reset a port to character mode in the absence of a connected terminal, the program in *Listing 1* can be used. This program will simply set DVT word 20 to an octal 77, which configures the driver for character mode.

Q: I have been using the LP spooler on my 1000 to handle incoming print jobs from a 9000. This has all worked fine until recently when I changed the host name on the 9000 from a single name, 'bones,' to a fully qualified name, 'bones.mayfield.com'. Now the LP spooler can't seem to find the files to be printed on the 1000. When I look in the */usr/spool/lp/request/* subdirectory, I see file names as follows:

CA110BONES.MAYF DA110BONES.MAY

and the LP spooler complains with:

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Lpout: No such file /usr/spool/lp/request/local1j/cA110BONES.M

A: The LP spooler as written could handle only single field host names and only eight characters max. Because ARPA standards allow multifield host names, this defect has been corrected. Since the RTE file system uses the "." as a special character delimiting a file type extension, what you will now see in the /usr/spool/lp/request/ directory are files named as follows, where the "." has been replaced with a) :

CA110BONES2)MAY

DA1011BONES2)MAY

A patch for this is available from the Response Center.

Q: Does HP have an RTE to HP-UX migration product?

A: Yes, late last year HP introduced the B3888AA product, which is a tool designed to aid in the porting of RTE-A FORTRAN code to HP-UX.

The product consists of a Migration Analysis Tool, MAT, a Migrator program, FTNMIG, and a Migration Library.

MAT examines source code and provides statistics to help determine the amount of effort in porting the source to HP-UX.


FTNMIG assists in the actual conversion process by converting code for use with f77 on the HP-UX host.

The Migration Library contains over 100 HP-UX routines using the same calling

sequence as RTE-A, which can greatly reduce the time and effort required to migrate a program.

This product runs on HP-UX. Users have requested versions of either MAT or FTNMIG that run on RTE-A, but this most likely will not happen.

I have successfully used the tool to migrate a 400-line FORTRAN program to HP-UX, with a minimum of effort. Only one RTE-A system call required manual editing in order to compile and load the program. Other than that, FTNMIG performed all changes required.

If you are interested in more information on the B3888AA product, contact your local HP Sales office, or call (408) 447-6622 for direct HP 1000 product information. 

Walt Boeninger is a support engineer at the HP Response Center in Mountain View, California. He has been supporting the HP 1000 for more than 15 years. His e-mail address is walt@hpwrcxe.mayfield.hp.com.

MISC

ispell

I HAVE BEEN MEANING to try out *ispell* for over a year. But for some reason, I never got around to downloading and installing the software. Until now. I became fed up writing articles (such as this one), thinking that I was submitting typographically correct manuscripts and later reviewing them only to find obvious spelling errors.

The *ispell* software (the latest version is 3.1.18) can be downloaded from <ftp.math.orst.edu> in the *pub/ispell-3.1* directory. By default, the software comes with English dictionaries. Read the README file for hints on where to find dictionaries for other languages. Installation is trivial. Copy file *local.h.samp* to *local.h*, edit this file to taste, and do a make. Make sure you are not using the GNU make program since its behavior appears to be incompatible with the traditional make program (I found out the hard way).

My e-mail program of choice is *mh*, which is interfaced through *emacs*. By adding appropriate lines to my *.emacs* file, as described in file *ispell.el*, when I send e-mail to someone, *ispell* is automatically invoked by *emacs*.

TkMan

If you are a man page user then this program is for you. Man pages are the online documentation available on most UNIX systems. Typically, you enter a command such as `man df` and a nicely formatted description about the *df* command is presented.

This program is a graphical, hypertext manual page browser. The presentation of the information is very attractive to the eyes. It offers hypertext links to other man pages by allowing

you to click on the word in the man page that corresponds to another man page reference. Other features include full text searches, a list of recently referenced man pages, and a user-configurable "hot" list of references.

The software is based on *Tcl 7.4/Tk 4.0* (which obviously must be installed on your system). The current version of *TkMan* is 1.7.3. It can be found on <ftp.cs.berkeley.edu> as */ucb/people/phelps/tcltk/tkman.tar.Z*. In addition to *Tcl/Tk*, you must also install the latest version of *ResettaMan* (a manual page filter). This software can be found on the same system and same directory as *rman.tar.Z*.

comp.windows.x

asWedit (Version 1.1.1)

This program is offered as shareware by its author, Andrzej Stochniol (A.Stochniol@ic.ac.uk). He describes the availability of the software as follows: "asWedit is available for free for students and staff in education and charitable non-profit organizations, and for free evaluation by individuals and commercial organizations. See the license for details."

asWedit is an easy-to-use text editor for the X Window System. "In addition to standard text editing features, it offers context-sensitive HyperText Mark-up Language (HTML 3 and HTML 2) modes for editing of files used on the World Wide Web (WWW)." The software is available on a variety of systems including HP-UX 9.x (but not HP-UX 10.x). It can be downloaded from <ftp.umbc.edu> in directory */pub/unix/www/asWedit/*. If you're in Europe, use site sunsite.doc.ic.ac.uk, directory */packages/www/asWedit/*. I couldn't find the HP version in this directory (on <ftp.umbc.edu>) but did find it in one directory below

this as *old-1.1/asWedit-1.1-hp.hpux9.tar.Z*.

No documentation accompanies the software nor is there any description of what you get if you pay for it. No price is listed either! There is a nice hyper help aid, however. I'm not an expert on writing Web page documents so I cannot fairly assess the value or usability of this product. I have been thinking about building my own home page. Maybe I'll use this tool.

comp.security.unix

icmpinfo

Version 1.11 of this utility was just released by Laurent Demailly (*dl@hplyot.obspm.fr*). *Icmpinfo* is a small tool that monitors and decodes all ICMP IP messages. It is particularly useful for looking at pings to your host (option-vv) and certain types of IP "bomb" attacks on your system. It works on most UNIX systems, including HP-UX, and just requires a make. The software is available from the source at *hplyot.obspm.fr:/net/icmpinfo-*.tar.gz*. It is also mirrored on *ftp.leo.org:/pub/comp/networking/net-tools/icmpinfo/icmpinfo-*.tar.gz*.

opie

For the security conscious amongst us (and today, everyone should be security conscious), this is a package that helps secure access to systems in an open network such as the Internet. Based upon the package *S/Key* from Bellcore Corporation, *opie* (One-time Passwords In Everything) was developed at and for the United States Naval Research Laboratory.

The need for *opie* arises because accessing most terminal programs such as telnet requires the user to enter a user name as well as a password. This pass-



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word is sent over the network in clear text from the local host to the host that you want to access. Many systems have been broken into by people monitoring various locations on the network. This well-documented package offers a solution to the dilemma. The software is available via ftp from *ftp.nrl.navy.mil* as */pub/security/nrl-opie/opie-2.04.tar.gz*. Other related files of interest are also located in this directory.

comp.lang.perl.misc

router-stats

Do you need a way to justify that really fast Internet connection you always dreamed of? If this tool doesn't convince your management, then you really don't need the speed. Iain Lea (*iain@scn.de*) from Siemens AG in Germany needed to know how much data was pumping through his routers. He developed a set of scripts written in *Tcl/Expect* and *Perl*

that gather the relevant statistics and generate pretty bar graphs of the collected data.

If you want to see what the graphs look like, check out the Web page *http://www.scn.de/~iain/router-stats/*. You can also use that Web page for downloading the software. Alternatively, you can directly ftp it from *ftp.scn.de* as */pub/networking/router-stats.tar.gz*. The software requires that the following packages be installed on your system: *Perl*, *Tcl*, *Expect*, *Gnuplot*, and *Netpbm*. The above mentioned Web page has links to sites where you can automatically download all of these software packages.

libwww-perl

This is a neat package consisting of a library and programs for doing Web programming. In particular, *libwww-perl* consists of a library of *Perl* packages that provide a simple and consistent programming interface (API) to the World

Wide Web. Copyrighted by the University of California, "the library is being developed as a collaborative effort to assist the further development of useful WWW clients and tools."

Two versions of this package exist, one for *Perl 4.0* and one for *Perl 5.0*. The *Perl 4.0* version is available either from the home page <http://www.ics.uci.edu/pub/websoft/libwww-perl/> or via ftp from www.ics.uci.edu in directory `/pub/websoft/libwww-perl/`.

I was able to find only the *Perl 5.0* version via an http address, <http://www.oslonett.no/home/aas/perl/www/>. The *Perl 5.0* version is a complete rewrite of the *Perl 4.0* version and offers some extended functionality.

WWW

I believe I goofed. In a previous issue of *hp-ux/usr* I had listed the Fortean Times home page. It appears that this http address has changed. The new address is <http://fortean.mic.dundee.ac.uk/ft/>.

<http://lawlinks.com>

If you are searching for lawyers or lawyer jokes, this is the Web page for you. Lawlinks provides a place for all people interested in the law to congregate and obtain information. If you need an attorney in a particular city or if you want to stay abreast of current legal topics, this is your Web page.

<http://www.iag.net/~ubr/index.html/>

I'm not convinced that this idea is going to work. But I did my share. This Web site is called The Internet Phonebook. The idea is that you should be able to find people easily on the Net by using world, country, and state image maps (currently over 380 countries

listed). You also get a free listing and a free personal home page.

<http://www.polaris.net/ugu>

This is the home for the Unix Guru Universe, the official home page for UNIX system administrators. This site, with keyword search capability, contains information about networking, security, vendors, careers, and many other subjects. System administrators should check it out.

<http://www.bigeye.com>

This Web site is worth keeping on your short list for those days when you really feel the need to surf the Internet. This site lists 250 carefully chosen Web sites. Each link's URL is typed, making this an excellent bookmark and useful for printing as an off-line reference.

<http://dejanews3.dejanews.com/>

This is a really, really neat site. *DejaNews* is a tool that provides access to a Usenet archive. If you are looking for references to any subject in any newsgroup, then this tool will find them for you. The database is updated every two days. They claim that their archive is the largest collection of indexed Usenet news available anywhere (with the exclusion of *alt.**, *soc.**, *talk.** and **binaries*). This amounts to over 4 gigabytes of data. Quoting from one of their Web pages: "Selected groups have an extended history of up to a year. As resources allow, we will plan to eventually offer an entire year of history on all of the groups (except the excluded ones described above). If you'd like to have the full-year history of your favorite group available now, just send us e-mail to groups@dejanews.com and let us know. We'll pull the last year's articles for that group off

the archive and add it to the database. Once it has been added, you'll get an e-mail confirmation that it's now available." Pretty neat!

<http://www.careerpath.com/>

Are you looking for a job? Well, six major newspapers have combined their help wanted listings in a special database that is now available on the Internet via a Web browser. Job seekers can check out ads from *The Boston Globe*, *Chicago Tribune*, *Los Angeles Times*, *The New York Times*, *San Jose Mercury News*, and *The Washington Post*.

<http://www.teleport.com/~merlyn/UnixReview>

Since I've referenced a couple of programs using *Perl*, I'll also take the time to mention that Randal Schwartz is now publishing online his *Perl* column from *Unix Review* magazine. Schwartz wrote one of the O'Reilly *Perl* books; he's very qualified to discuss the *Perl* language. ■

Joe Berry is a senior software developer at Landmark Systems Corporation in Vienna, Virginia. He is one of the authors of Landmark's performance monitor, TMON for UNIX. A former HP 3000 systems specialist for Hewlett-Packard, he has been in the computer industry for more 20 years. He can be reached at joe@landmark.com.

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CIRCLE 98 ON READER SERVICE CARD



CSL Perspective

IN MY LAST COLUMN, I spent time reflecting on the business value derived from using public software within our organizations. During the discussion I proposed cycle time as one of the areas in which public software can make a contribution. One of the common definitions of cycle time is the time it takes to execute a process from start to finish. Developing a product, assembling an automobile engine, cooking a gourmet dish, or adding a new disk to a system all have a process associated with them. Processes are simply the steps or actions taken to transform inputs to outputs. Sometimes, these processes are defined, articulated, and documented in great detail, while others simply exist in our conscious mind. As computer professionals, we are process-driven every day.

I also pointed out that dealing with short cycle times or even reducing them is a significant issue, especially in the computer arena. The theory is that by reducing cycle times, we can bring products to market faster, improve quality, and boost productivity. Makes sense in theory, but doing it in practice is next to impossible unless you take a serious look at the processes and subprocesses involved.

Back in the early days of data processing, the primary justification for implementing computers in a business was to automate what were, for the most part, manual processes. For example, the payroll systems at that time involved the manual generation of paychecks along with a great deal of simultaneous bookkeeping and accounting. When you add in all the auxiliary processes such as reconciling absences, change of jobs, and overtime, it quickly became rather complex, people-intensive, and very time-consuming. The introduction of data processing machines (remem-

ber punched cards?) and computer systems took the existing "process" and simply removed the most costly element, the people.

Over the next 30 years, automation was the winning idea. Other commercial processes, manufacturing, and even human processes were further optimized through the use of technology. Industry was able to realize substantial productivity gains and cost reductions by continuing to find more ways to automate. What many didn't realize, though, was that the rate of gain was beginning to flatten as we began to reach the limits of the processes themselves. As market pressures forced more and more businesses to change, our processes became the most significant barriers to continued success.

Many of these same dynamics have been at work even within our user group. The dynamic nature of our business has continually pushed us to reevaluate and refocus our thoughts and resources on furthering the mission and goals of Interex. Our strategic planning processes initially came about as a result of the realization that the HP marketplace was changing.

That change occurs is not an indictment of our success or of our processes, but is a critical indicator that the time may be ripe for a serious reassessment. Five years later, we are again reassessing ourselves, and focusing on our values, our mission, and our vision for the future. We're also focusing more on our processes by not only optimizing but in some cases reengineering them to deal more effectively with the critical issues of our users and the organization that serves them.

The CSL is a significant part of this change. We're becoming more online-

focused, needing to react quicker to member needs. There is a growing realization that we might not be as good at some aspects of our work as others. So we're forging new relationships with other groups, working together as users to accomplish our mutual goals. HP, the InterWorks Technical Forum, the Public Domain Software Archive (aka Liverpool), and other groups are working more closely than ever before.

This process of change can be a bit nerve-racking and sometimes rather frustrating. It is not easy, but the dedication and commitment on the part of the Interex staff and volunteer committees will help us over those bumps. You also have a role to play during this time of transition. As we change our processes, we need to consider new ideas, ask "dumb questions" of ourselves, and bring new ways of thinking to bear on the problems we face. Maybe you have some experiences to share, some issues or questions that we might have overlooked. Don't be afraid to raise issues with any Interex person you might talk to. We HP users tend to be a pretty straightforward group, after sitting through a few roundtable discussions.

I hope you take some time to give us your thoughts. You'll have to excuse me now, I've got some process redesign work to get back to. Happy New Year to you and yours. ■

Paul Gerwitz is chairman of the CSL Committee and is a Senior Technology Specialist at Eastman Kodak Company in Rochester NY. He can be reached at 716-477-3067 or e-mail at gerwitz@interex.org or gerwitz@kodak.com.

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Industry Watch

LIGHTS, CAMERA, INTERACTION! That was the call this past autumn as a number of new teleconferencing and interactive video products were announced around the industry.

Silicon Graphics unveiled the InPerson desktop videoconferencing software and is shipping it with Indy and Indigo2 workstations. SGI says InPerson is ready for real-time, multiparticipant conferencing using interactive video, audio, 3D models, images, and text; and it can be used with any TCP/IP network. The only question is, Are any real people ready for multiparticipant conferencing using interactive video? Well, it's got a great name, but it doesn't seem like the kind of technology ready for bundling, yet.

Speaking of bundling, Data General teamed up with buddy Virtual Reality Network, Inc. (VRNI) to provide videoconferencing for real estate offices and financial institutions. DG claims their system, "which combines VRNI's LoanMaker software with Intel's ProShare Video 200 running on a DG PC," will provide prospective home buyers with same-day, direct approval service for obtaining a mortgage. Users in a real estate office would interact face-to-face with a loan facilitator using LoanMaker to provide the potential buyers with a selection of loan options. Let's hope it brightens up the whole dismal process.

Norway will certainly be shining brightly this year and it won't be just from the midnight sun. Digital has partnered with Telenor, the Norwegian PTT, to try out interactive TV using Digital's Mediaplex server. The trial will take place at 35 sites in Oslo, including schools, Telenor offices, and homes. Telenor plans to deliver 35 simultaneous video streams during the first stage

of the trial and will be working with Digital to develop the user interface for the system. Set-top boxes will be provided by Apple, while ADSL transmission technologies (to enable the communication of video signals over the copper pair telephone network) will be supplied by Italtel and Amati. Interactive services are to include movies-on-demand, distance education, music videos-on-demand, children's programming, and a variety of consumer information services.

The Sun on this side of the Atlantic will be shining, too. In the fall Sun Microsystems's Interactive Services Group announced a line of servers for networked interactive video Sun MediaCenter. The company claims these servers will make it possible for a business to receive, store, distribute, and play video over an enterprise network. Sun is hoping that by integrating its servers into the corporate network, businesses will be quicker to adopt video in their day-to-day activities. It wouldn't hurt if they had to adopt more servers, either, I don't imagine. The Sun package will support workstations, PCs, and interactive set-top boxes, and includes MediaCenter software (running on Solaris 2.4) and device drivers, as well as Fast Ethernet and ATM network interfaces.

The server biz, generally speaking, had its "highs" and "lows" this fall. At the high end, HP announced their new HP 9000 Model T520—which the company claims offers the industry's best performance—along with two midrange servers, the K210 and K410. In recent TPC-C benchmarks, HP says a 12-way T500 bettered a 20-way Sun SPARC-center 2000E by 55 percent and that the T520 is expected to show another 20 to 30 percent performance improvement

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over that. All three servers run HP-UX 10 and can be upgraded to HP's 64-bit PA-8000 by replacing a board.

If you want to jump into 64-bit processing right away, you can check out the latest RISC servers from Digital. They claim to have cornered the market at the low end, with two new UNIX RISC servers—the uniprocessor AlphaServer 1000 4/266 and AlphaServer 400 4/233—each coming in at under \$25,000. Digital claims the servers deliver “large-system performance at small-system prices,” and is targeting them as database servers, application servers, and PC LAN servers for workgroups. The AlphaServers can run either Digital UNIX or Windows NT. And if you're feeling RISCy, both servers also come with a generous three-year warranty.

IBM certainly wasn't taking any chances. They announced server enhancements up and down the line. Since we're talking RISC, their new entry-level offering is the RS/6000 Model E20 with appropriate accoutrement for a departmental application server—such as IBM's new AIX Connections feature (available in AIX 4.1.4), which is supposed to allow all kinds of PC clients, operating systems, and LAN architectures to access E-20 services. AIX 4.1.4 also has the obligatory Internet browser. And a new multimedia product, Starworks, comes in the package so users can add audio, video, and images to otherwise bland client-server applications. ■

James H. Gamble is a freelance writer and communications consultant for technology-based products and services companies. He can be reached by phone at (603) 673-1904 or by e-mail at jhg@mv.mv.com.

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Product Focus

Bluestone Sapphire/Web

Bluestone has announced Sapphire/Web, a visual development tool for building client-server applications for the World Wide Web (WWW). The company notes that its product is the first tool available to allow companies to develop robust internal and cross-enterprise applications for the Web.

Jeff Whitney, Bluestone's director of marketing, noted that there are actually more internal Web servers in use than there are on the Internet. He attributed the Web's popularity for internal use to the easy deployment of applications it allows. "From the client side, it's instantly cross-platform."

Internal use of the Web is exemplified by a large company in Chicago that holds 100,000 chemicals in a database. This

information must be shared among 10,000 PCs, and the Web enables the company to disperse the information without deploying an application to each of the PCs. With the Web, Whitney explained, the company's MIS staff needs only to "give people their URL (Uniform Resource Locator), and *voilà*, they have a deployed application."

The Web lends itself well to such cross-platform applications because it "is automatically a three-tier (client-server) architecture," and therefore each component is platform-independent with respect to the other components, Whitney explained. "The GUI is sitting on your desktop, the Web server is where the application logic can run, and then the back-end is where you have your databases," he added.

Easy development of Web pages has also contributed to the Web's popularity. "From the GUI standpoint, it's so easy to develop. Almost anybody can put together an HTML page," said Whitney. However, he added, generating the application logic that accesses information from back-end databases can be difficult. This code, known as Common Gateway Interface (CGI) code, is typically generated in perl. It also tends to be embedded in the application that accesses the back-end database, so every time the back-end architecture is changed, the application code has to be changed.

Sapphire/Web simplifies CGI code development because it is a visual development environment. "A good deal of people can get an application up and running within an hour, without looking at the documentation," Whitney stated. He compared Sapphire/Web to Microsoft's Visual Basic, "but we don't have some of the architectural limitations that Visual Basic is accused of

The Bluestone Sapphire Web development environment (with Bluestone's home page in the background).



having.” Whitney emphasized that Sapphire/Web “is real robust, to support real business applications.”

To illustrate how easy it is to develop solid Web applications with Sapphire/Web, Bluestone’s product literature breaks the process into six steps:

1. Develop HTML documents (the GUI front end) with any HTML editor, word processor, or text editor. Any HTML editor can be integrated, or any HTML document can be loaded, into the tool for easy HTML editing from within Sapphire/Web.
2. View and edit SQL, stored procedures, functions, executables, and files, which are treated as either database or application objects. These objects are used in the

application production process.

3. Bind HTML to the relevant database and application objects through use of Sapphire/Web’s Object Bind Editor.
4. Add customized object binding and code.
5. Test the application. Sapphire/Web provides for automated CGI program testing, as well as a mechanism to include additional tools, such as a debugger, within the test facility.
6. Generate CGI code. Sapphire/Web generates CGI script in either C or C++. The executable size of these applications is said to be smaller and faster than comparable perl scripts.

Bluestone intends to “take advantage

of all the technologies” for the Web as they become available, Whitney noted. He revealed that Sapphire/Web had recently been enhanced to support frames in Netscape (announced three weeks prior to time of this writing), as well as Java. He explained, “We treat these as objects, so we can leverage these technologies” and still enable users to access functions and executables previously available.

Sapphire/Web can be downloaded for evaluation from Bluestone’s Web site. The product is priced at \$2,495 per developer seat, with education and government discounts available. No runtime license is required.

Contact Bluestone, Inc., phone: (609) 727-4600, e-mail: info@bluestone.com, WWW: <http://www.bluestone.com>.

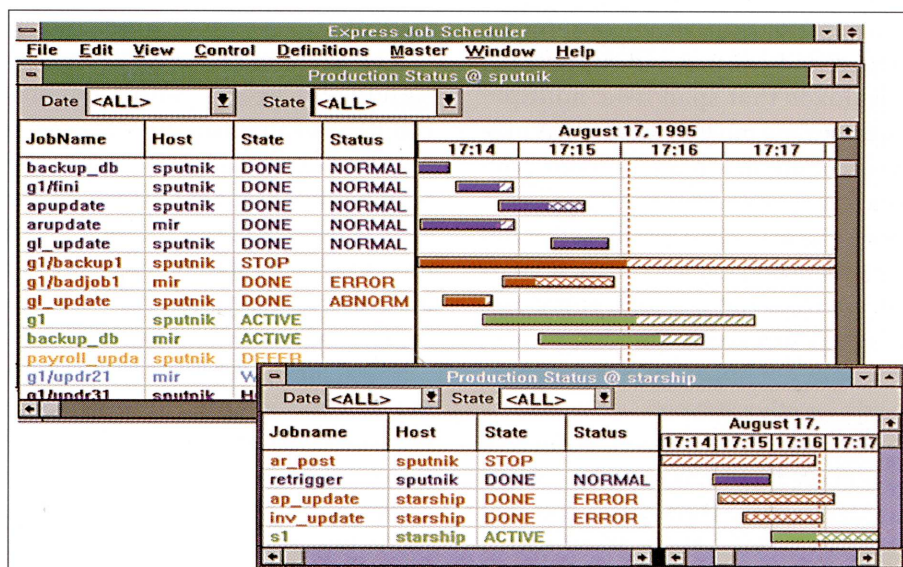
OCS EXPRESS for UNIX

Operations Control Systems has announced new fault tolerance and workload balancing options to the EXPRESS for UNIX automated job scheduling and workload management product. Jim Lofink, OCS’ director of marketing, stated that EXPRESS provides the ease of use and flexibility more characteristic of job scheduling solutions for mainframes than for UNIX.

Because some of OCS’ customer base does not have long-standing experience with UNIX (the company has been providing data center management solutions to the HP 3000 community since 1978), OCS’ goal is to “make (the customer’s) transition in the UNIX marketplace as simple as possible,” said Lofink. OCS had long been providing ease of use and automation features for legacy systems, so the company

leveraged its expertise to create EXPRESS for UNIX. Lofink emphasized, however, that OCS didn’t just port the solution. “We started from the ground up.”

The EXPRESS GUI interface makes the product easy to use. The scheduler’s



The OCS EXPRESS for UNIX job scheduler. This window shows two master schedules.

interface is in GANTT format, a graphical chart that lists jobs and indicates job status with color-coded bars and text. EXPRESS also enables users to choose from any one of three front ends: MS Windows, Windows NT, and Motif (a command-line interface on character-based terminals is also offered). As a result, explained Randy Keck, EXPRESS product manager, system administrators can perform job management functions "from wherever you're comfortable."

EXPRESS provides flexibility, as well as ease of use, in its scheduling. Believing that "the power of your calendar is the power of your scheduler," Lofink said EXPRESS offers a date expression language rather than hard-coded date selection. The date expression language enables users to better schedule jobs around holidays and other exceptions in a regular schedule. Keck added that this feature is "a typical requirement" in the mainframe world, but it is a rarity in UNIX job schedulers.

One of the significant features of this new release is the master/agent scheduling architecture, which provides for centralized control and support for workloads that span over multiple machines and multiple locations. A master schedule that resides on one platform can control virtually any number of local or remote agent machines that run the production job workloads. It holds the job rules and can send entire jobs to agents that reside on other servers, as well as just initiate jobs that already reside on other servers.

Regardless of the master/agent configuration, EXPRESS provides a single point of control. The front-end point of control can be a Motif, Windows, or command-line interface. Emphasizing that EXPRESS is a "true client-server

application," Lofink said that a user can "put these interfaces anywhere" among the networked computers; many clients can access a single master, or a single client can access many masters.

The agent in OCS EXPRESS is an "intelligent agent," which enables EXPRESS to automatically balance job workloads on multiple agents in the most optimal manner possible. In the event of network failure, the agent allows users to see if a job is complete, to store job status, and to resend the job when the network comes back up.

Configuring the workload balancing function is designed to be a simple process of creating a host list out of a pick list that shows which hosts are available. Specification of host lists can be by business function, locations, application requirements, or any other grouping.

OCS EXPRESS is designed to integrate with HP OpenView and other frameworks to provide application-independent, platform-independent job scheduling.

EXPRESS for UNIX pricing begins at \$9,000, with discounts for volume purchases.

Contact OCS, phone: (415) 493-4122, fax: (415) 493-3393.

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Michelle Pollace is the New Products editor for hp-ux/usr.



New Products

New from Storage Dimensions

Modular Disk Tape Storage System

Storage Dimensions has announced MiniFlex, a two-bay storage system with pluggable disk and tape modules for small workgroups, workstations, and remote office applications. MiniFlex's modular design, easy manageability, and common components with other Storage Dimensions storage products make the system ideal for customers looking to standardize on a common platform for small storage requirements throughout the organization.

MiniFlex is well suited for desktop environments and can easily be moved from one environment to another. The system, which can house up to 8 GB of disk storage or 16 GB of tape backup, supports multiple operating environments.

Available now, the MiniFlex enclosure is priced at \$725. MiniFlex is also offered preconfigured with two 2-GB or 4-GB disk drives (5,400 rpm) for \$3,300 or \$4,900, respectively.

Trade-In Program

Storage Dimensions has also announced FlexCredit, a rebate program that provides a 50 percent credit toward new-technology storage for every megabyte of functioning used storage turned in.

Storage Dimensions accepts its own SCSI hard disk drives greater than 300 MB, as well as those from vendors such as Hewlett-Packard, Compaq, IBM, Seagate, Quantum, Maxtor, Micropolis, Sun, and Conner Peripherals.

Contact Storage Dimensions, phone: (408) 954-0710, fax: (408) 944-1200.

Call Center Operations

Information Management Associates, Inc. (IMA) has announced EDGE

TeleBusiness Software Release 3.5. EDGE is a UNIX-based application and development environment designed specifically for call center operations such as inside sales, customer service, product support, and field sales. EDGE 3.5 has additional capabilities to integrate with advanced call center technologies, including CTI and voice/data. It offers Unique Account Processor (UAP), a sophisticated system for locating duplicate or related records in the database. The EDGE 3270 Gateway module seamlessly combines existing mainframe data with contact data stored in EDGE.

The new screen painter offers an improved interface for designing application screens, and a new sampling option provides for testing the report criteria prior to running the query.

Contact IMA, phone: (203) 925-6800, fax: (203) 925-1170.

Metrics Analysis

ObjectSpace, Inc. has announced a new version of ObjectMetrics, which allowed developers to gather software metrics that indicate problem areas such as overly complex code, unnecessary coupling between modules, and the misuse of inheritance. The tool uses a clear, intuitive graphical user interface.

ObjectMetrics is coupled with the Metrics Analysis Tool (MAT), a storage and reporting mechanism for metrics gathered using ObjectMetrics. MAT is used to assist managers and project leaders in graphically illustrating technical comparisons between projects or applications.

The ObjectMetrics 2.0 costs \$995 for a five-user pack, which includes one MAT copy. ObjectMetrics works with VisualWorks 1.0 and 2.0, VisualWorks/ENVY 1.43, and Visual Smalltalk 3.0.

Contact ObjectSpace, phone: (214)

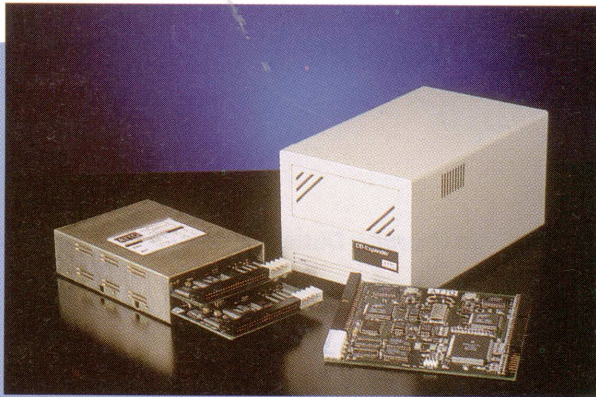
CD-ROM Expansion

ATTO Technology has announced the CD-Expander, said to be the first expansion device designed specifically to allow up to 49 CD-ROM drives to be supported from a single host adapter.

The CD-Expander uses Logical Unit Numbers (LUNs), which are a subset of the SCSI bus IDs. By using LUN addressing, the CD-Expander supports 7 standard CD-ROM drives at each SCSI bus ID, increasing the number of SCSI CD-ROM drives from 7 to 49. Because these CD-ROM drives are online, users have instant access to the data.

The CD-Expander eliminates the need for users to make modifications to applications, system memory, or software drivers. It is available both as a stand-alone unit and a 3.5-inch drive form factor.

Contact ATTO Technology, phone: (716) 691-1999, fax: (716) 691-9353.



**ATTO
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for real-time communication, the CSW Task Optimization facility directs workers through multiple series of tasks. Prioritized tasks are automatically matched with available equipment and warehouse workers, based on the location of the worker and the task.

The Task Optimization option can be applied to receipts of inbound inventory, advance shipping notice (ASN) receipts, putaway, picking, bin replenishment, and cycle counting.

Pricing starts at \$150,000.

Contact Cambar Software, phone: (803) 747-4900, fax: (803) 554-2970.

934-2496, fax: (214) 663-9099, e-mail: info@objectspace.com.

Backup

ORBiT Software has announced its BACKUP/9000 product for HP 9000 systems running HP-UX. BACKUP/9000's advanced features include faster backup and restore, error handling and recovery, network backup, multiple-volume and multiple-device backup, data compression, and backup and restore of popular DBMSs. BACKUP/9000 can be controlled from a command-line interface or GUI and includes user-friendly facilities for configuration, scheduling, and automated tape library management.

BACKUP/9000 is a companion product to ORBiT's Plan B/UX product, which backs up networked PCs to an HP 9000 system's disk space and/or backup device.

Contact ORBiT Software, phone: (510) 837-4143, fax: (510) 837-5752, e-mail: sales@orbitsw.com.

Backup

Cactus International has announced The Backup Professional, its enterprise-

wide, network backup product that implements true bit-level verification of archived data across the network. Also included is the new PC Crash Air-Bag, which ensures rapid hard disk crash recovery of any PC on the network, directly from the server.

It supports 26 vendor TCP/IP protocols, Windows NT, Windows 95, OS/2, and most flavors of UNIX. It handles business-critical backups, including raw partitions, links, symbolic links, empty directories, and virtual files. Users can create full backup history, tape labels, and backup labels. Furthermore, files are compressed in a streaming fashion to the backup device, so that no intermediate files are created.

Contact Cactus International, phone: (301) 829-1622, fax: (301) 829-1623, e-mail: info@cactus.com.

Warehousing Software

Cambar Software has introduced Task Optimization, an extension of the Client-Server Warehousing (CSW) software system. Task Optimization adds real-time labor management functionality to Cambar's warehousing product.

Using radio frequency (RF) devices

Ada 95

Thomson Software Products (formerly Alslys) has announced the signing of an agreement with Intermetrics, Inc. to integrate Intermetrics' AdaMagic front-end compiler technology with the ObjectAda development environment. The agreement will make it possible for Thomson Software Products to offer a full Ada 95 object-oriented programming environment in the first half of 1996.

ObjectAda 7.0 will include multi-language capabilities, increased object-oriented support, and a scalable, tightly integrated, and flexible set of development tools.

Ada 95 incorporates object-oriented programming capabilities and increased support for real-time systems. Ada 95 is an ANSI standard.

Object Ada 7.0 will be available on HP 9000s and other platforms.

Contact Thomson Software Products, phone: (619) 457-2700, fax: (619) 452-2117.

Computer-Based Training

Open Systems Training has announced "UNIX User:CBT" and "Advanced UNIX

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User:CBT," two computer-based training courses for UNIX.

"UNIX User:CBT" is a three-hour, graphics-based computer-based training course that introduces the major features and components of the UNIX operating system and teaches basic UNIX user functions, including how to log in and log out, get help, enter commands, communicate with other UNIX users, manage files, and navigate the UNIX directory structure.

"Advanced UNIX User:CBT" is a six-hour, graphics-based computer-based training course that expands on the topics covered in the "UNIX User:CBT." It teaches how to manage UNIX files and processes, create and use shell scripts and variables, and use selected UNIX utilities.

The courses are priced at \$895 each and are available for Windows, HP-UX, and other platforms.

Contact Open Systems Training, phone: (800) 633-UNIX, fax: (508) 898-2382.

Object Development Workbench

System Software Associates, Inc. (SSA) has announced three new object-oriented application development products that are part of a suite of object-oriented appli-

cation development tools called the Object Development Workbench (ODW). The new tools include Object Definition Facility (ODF), Object Repository, and Gen/C++ for Windows.

ODF implements the specification layer of the architecture, the level at which the application, independent of a specific platform, is defined. The output of ODF is a

set of business objects that completely specifies the application. ODF stores the business objects in the Object Repository. Based on the business objects stored in the Object Repository, Gen/C++ for

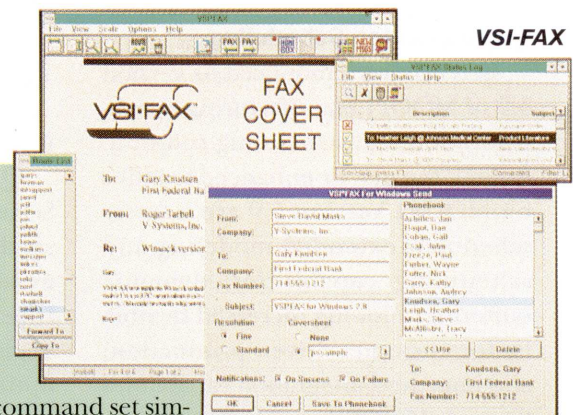
Network Faxing

V-Systems, Inc. has announced VSI•FAX for Windows 2.0, which enables any Windows PC connected to a UNIX server to quickly and easily send, receive, view, route, and archive faxes. It supports connection to the UNIX host using standard Winsock implementations.

The fax server enables all character, X-Window/Motif, and UNIX workstation applications to easily integrate and administrate fax services with a command set similar to the UNIX lp spooler.

VSI•FAX UNIX Fax Server software is priced from \$995 and operates on all popular UNIX platforms. Pricing for the VSI•FAX for Windows 2.0 client package begins at \$99 and decreases based on quantity.

Contact V-Systems, phone: (800) 556-4874 or (714) 489-8778, fax: (714) 489-2486, e-mail: info@vsi.com.



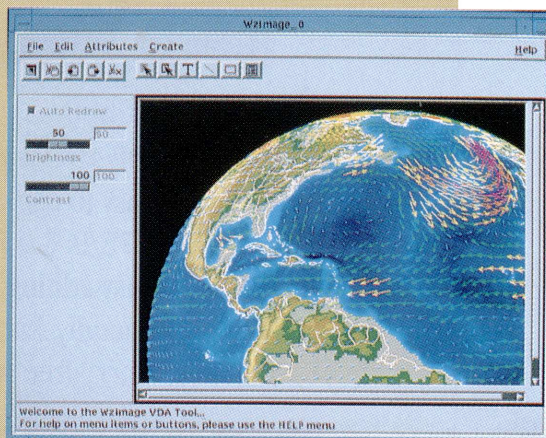
Rapid Application Development

Visual Numerics, Inc. has announced PV-WAVE Version 6.0. PV-WAVE consists of four components: the PV-WAVE Foundation, which is the base product and the three "companion technologies" of PV-WAVE:IMSL Mathematics, PV-WAVE:IMSL Statistics, and the new PV-WAVE:Visual Exploration.

PV-WAVE Foundation's programming language has been significantly extended with new data types and data manipulation features to support object-based development. PV-WAVE 4GL enables the building of data analysis and visualization applications without the compile, link, and debug cycles required by traditional programming languages like FORTRAN or C. It now contains a "hook" that facilitates the integration of independently developed functions into PV-WAVE.

Prices for a floating UNIX license of PV-WAVE Foundation start at \$4,495. The media is CD-ROM and includes online documentation. The companion technologies each list for \$1,495 for UNIX.

Contact Visual Numerics, Inc., phone: (303) 530-9000, fax: (303) 530-9329, WWW: <http://www.vni.com>.



Visual Numerics PV-WAVE 6.0

FireWall-1 from CheckPoint Software Technology, Ltd. FireWall-1 forms an impenetrable barrier against unauthorized access between internal networks and the Internet.

The SecureWatch price, including FirstWatch high-availability software and FireWall-1, starts at \$25,595. Integration and consulting services are optional.

Contact Qualix Group, Inc., phone: (415) 572-0200, e-mail: info@qualix.com, WWW: <http://www.qualix.com>.

Network Management

LOAN SYSTEM has released Sysmaster 3.30 for NetWare and UNIX. Sysmaster 3.30 for NetWare is a network management software package for monitoring system performance, events, and alerts, as well as running applications and licenses specific to Novell network administration.

Sysmaster for UNIX is available on HP-UX and other platforms. The Resource Manager module provides for real-time monitoring of more than 100 system parameters of UNIX servers and workstations, maintaining an accurate history of network activity and displaying categorized results. The Event Manager module monitors critical server events and stores a complete history of alerts that can be consulted by type, date, or priority.

A 30-day demo of Sysmaster 3.30 for NetWare is available. LOAN SYSTEM, a French company, is seeking distributors for the North American market.

Contact French Technology Press Office, phone: (312) 222-1235, fax: (312) 222-1237.

Object-Oriented DBMS

O₂ TECHNOLOGY has announced O₂ Web, a server development and man-

Windows generates executable object-oriented code for a Windows 3.1 or Windows 95 environment.

Each of the three component products is priced at \$2,500 per user.

Contact SSA, phone: (312) 641-2900, fax: (312) 641-3737, WWW: <http://www.ssax.com>.

Manufacturing Scheduling

Berclain has announced its Version 5.0 of MOOPI Manufacturing Synchronization and scheduling solution. Among the new or enhanced features on MOOPI Version 5.0 are a faster scheduler; extended modeling and scheduling capabilities; dynamic buffering, allowing increased flexibility for customer-driven production; and improved integration capabilities through MOOPI's open client-server architecture with ERP, MRPII, MES, and other systems.

The enhanced product was designed and developed with C++. The application is built around autonomous objects

that can be tailored to the user's specific environment. MOOPI Version 5 is built on a three-tier client-server architecture using standard TCP/IP communications protocol.

List prices for MOOPI applications range between \$60,000 and \$350,000, depending on the computer server and number of concurrent users.

Contact Berclain, phone: (708) 240-1260, fax: (708) 240-1270.

Internet Gateway Security

Qualix Group has announced Secure/Watch, said to be the first packaged software solution to address the need for highly available, secure Internet access and connectivity. SecureWatch provides 99 percent uptime for Internet access and connections. It is available for Sun and HP 9000 workstations.

SecureWatch combines FirstWatch, Qualix' high-availability software that provides failover management for systems, applications, and services, with

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agement tool for use on the World Wide Web (WWW). O₂ Web also offers all the standard advantages of an object-oriented database. These includes large-capacity data storage, the ability for users on different parts of the network to share data, system reliability, and ease of maintenance.

The company has installed several thousand licenses of its systems in more than 20 countries for application developers, value-added resellers, and product developers in a variety of industries including telecommunications, defense, manufacturing, utilities, energy, finance, insurance, medical, and geographical information systems.

Contact O₂ TECHNOLOGY, INC., phone: (415) 842-7000, fax: (415) 842-7001.

High-Availability Switch

APCON, Inc. has announced POWER-SWITCH for UNIX, which provides switching of external storage devices between primary and standby servers to ensure rapid recovery from system failures. It provides fully automated switching between similar or dissimilar servers to an external disk subsystem. The dual server design enables the standby server to be an active device on the network.

The switch monitors primary server operations. When it detects a primary server failure, the server is shut down and the standby server mounts the external disks. Systems can be configured to support multiple servers. Administrators can perform maintenance and troubleshooting without affecting mission-critical applications or users.

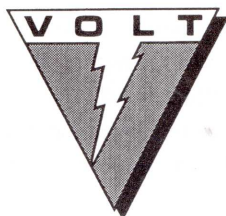
The POWERSWITCH for UNIX starts at \$6,200 and does not require expensive systems training or administration.

Contact APCON, phone: (503) 685-9300, fax: (503) 685-9099.

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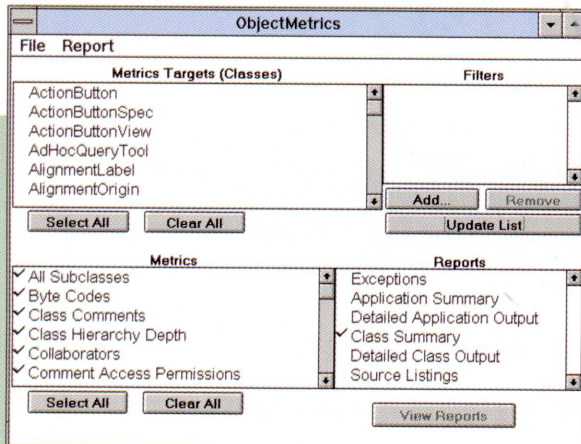
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XFaceMaker Non Standard Logics

GUI Builders

QualSoft Corporation and Non Standard Logics (NSL) have announced XFaceMaker Version 3.1. XFaceMaker is comprised of four compatible and upgradable GUI builders. It enables on-the-fly loading of third-party widgets,

application functions, or libraries. In addition, XFaceMaker enables any user on the network to view and search the complete documentation, equivalent to eight manuals, in hardcopy or Hypertext Markup Language (HTML) format.

A simple license key change transforms the tool from a \$995 interface development tool (XFaceMaker/IDT), to a \$3,500 intermediate-level interface management system (XFaceMaker/IL), to a full-featured \$5,000 UIMS (XFaceMaker/UIMS), to the \$9,250 XFaceMaker/Widget Factory for dynamic graphics or custom widget class creation. For \$995, XFaceMaker users developing relational database front ends can use XFaceMaker/db to build user interfaces portable among Oracle, Sybase, Informix, and CA/Ingres. All tools share the same user interface and dual-process, fault-tolerant architecture.

Contact QualSoft, phone: (415) 494-6100 or (800) 814-6351, e-mail: info@qsoft.com. Outside North America, contact NSL, phone: +33 1 44 08 70 80, e-mail: info@nsl.fr.

Reverse Engineering

Software Systems Design has announced Version 3.0 of GrafBrowse/C, which provides the capability to understand the design of C source code.

GrafBrowse/C analyzes the source and creates several different views of the design. A declaration view shows the internals of each source file. The invocation view shows the calling structure of the entire program. The users can easily see all calls, file dependencies, and structure on one view.

An interactive browser allows the user to traverse the code graphically. Post-Script output of any view is available.

GrafBrowse/C is priced at \$8,000 and is available on HP 9000 Series 700s and other workstations.

Contact Software Systems Design, phone or fax: (909) 625-6147.

Cross-Platform Development

Mainsoft Corporation has announced MainWin Studio, which consists of MainWin eXtended Development Environment 2.0, MainWin Help, MainWin Test 3.0, Visual SourceSafe for UNIX 4.0, and future developer tools and applications. MainWin Studio offers a single source code base for multiple platforms, a single set of test scripts, one version control system, unified documentation, and a single set of help files.

MainWin eXtended Development Environment 2.0 (XDE), formerly called MainWin Cross Development Kit, includes OLE 2.0, performance enhancements, expanded Win32 coverage (including common controls, file mapping APIs, and 32-bit handles), and support for HP-UX 10.0.

MainWin Test 3.0, a tool for automated Windows application testing, is priced at

\$5,000 for a single-user license. Visual SourceSafe for UNIX 4.0, a project-oriented version control system designed for cross-platform environments, is priced at \$500 for a single-user license.

Contact Mainsoft Corporation, phone: (408) 774-3400, fax: (408) 774-3404, e-mail: info@mainsoft.com, WWW: www.mainsoft.com.

E-Mail-to-Fax Gateway

The Bristol Group has introduced MIMEfax, a new e-mail-to-fax gateway that enables users to send and receive faxes via their e-mail package. MIMEfax is included in the latest release of IsoFax.

Users can now launch a MIME document from e-mail that is delivered as a fax or choose to receive a fax as an e-mail graphical element.

Documents sent from MIME-enabled e-mail to the IsoFax fax server for faxing will retain their graphical look and feel. IsoFax takes the recipient's name and fax number from the e-mail addressing information. The sender receives an e-mail notification from the fax server on the success or failure of the fax.

MIMEfax supports the HP 9000 and other UNIX platforms. Fax services are available for UNIX, PC, and Macintosh clients. A server with a "six pack" of floating client licenses that serves 15 to 25 people is available for \$3,500.

Contact The Bristol Group, phone: (415) 925-9250.

New from HP

Servers

HP has announced "three new symmetric-multiprocessing (SMP) servers, including one that delivers the highest commercial UNIX performance

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in the industry. The new systems are the HP 9000 Model T520 high-end server, which offers the industry's best performance, and the HP 9000 Models K210 and K410 midrange servers.

The new servers run HP-UX 10.0 and are based on the PA-RISC microprocessor. The systems also can be upgraded to HP's 64-bit PA-8000 processor simply by replacing a board.

The HP 9000 Model K410 server using four PA-7200 120-MHz processors achieved a TPC-C benchmark result of 3,809.46 transactions per minute-C (tpmC) at \$364/tpmC.

Models K210 and K410 support up to four PA-7200 microprocessors running at 120 MHz, from 32 MB to 2 GB of memory, and up to 8.3 terabytes of disk storage.

All models support Intelligent Optimization, a new feature of the HP-UX 10.0 operating system that enables the computer system and database to work together more efficiently and to reduce the need to access main memory.

HP 9000 Model T520 server ranges in price from \$145,000 for a uniprocessor to \$520,000 for a 12-way SMP configuration. The new high-end servers are scheduled to be available in the first quarter of 1996.

Model K210 and Model K410 servers, available immediately, begin at \$41,650 and \$67,350, respectively. Additional PA-7200 processors are \$15,000.

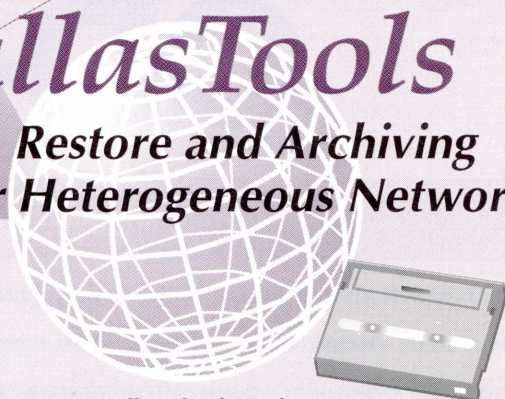
Middleware

HP has announced an update to its middleware, which is designed to reduce deployment time for business-critical distributed online transaction processing (OLTP).

As part of the initiative, HP has announced HP DCE/9000 1.4, an implementation of the Open Software Foundation's (OSF) latest DCE version

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with significant HP value-added work in the areas of systems management, application development, security, and performance. DCE/9000 includes one of the industry's best suites of GUI-based systems management tools. These tools work in multivendor DCE cells and provide comprehensive system-management services, from setup and configuration to user- and group-account management, to cell monitoring and troubleshooting.

HP also announced HP Encina/9000 1.2. HP's Encina/9000 has a new local- and remote-configuration facility, a feature unique to HP's Encina product. In addition, Version 1.2 is integrated with HP's SoftBench development environment for greater programmer productivity.

HP also announced CICS for HP 9000 1.4. Like Encina/9000 1.2, CICS for HP 9000 1.4 now integrates with MC/ServiceGuard and HP OpenView OperationsCenter. CICS for HP 9000 1.4 and Encina/9000 1.2 take full advantage of the HP-UX operating system,

including benefits such as using OmnibackII for fast system backup, Online JFS, and enterprise clustering.

HP Encina/9000 1.2, CICS for HP 9000 1.4, and DCE/9000 1.4 are orderable now. HP Encina/9000 ranges in price from \$150 to \$45,000. HP CICS for HP 9000 ranges in price from \$150 to \$177,350. The DCE client (executive) is now free on HP-UX 10.0 General Business Release. Prices for DCE/9000 1.4 products range from \$1,500 to \$34,000. ■

Attention vendors: New product announcements should be sent to New Products Editor, hp-ux/usr Magazine, Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA.

Submissions should be no longer than 150 words in length. Deadline for submission is 2-1/2 months prior to publication.

New Products refers to numerous products by their trade names. In most cases, these designations are claimed as trademarks or registered trademarks by their companies.

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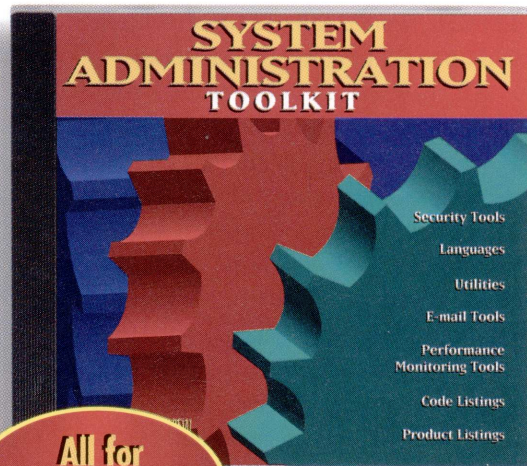
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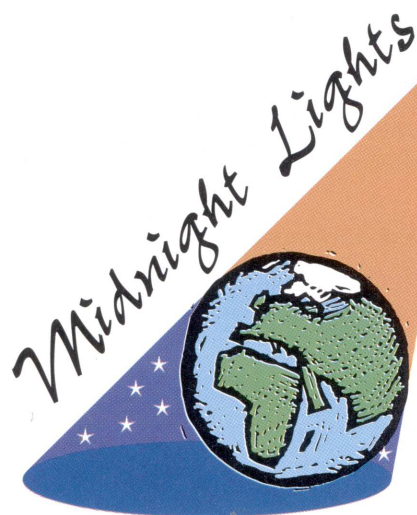
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110,111	Computer Solutions. (407) 649-0123/Fax (407) 649-1407	69,73
108	Concorde Technologies (800) 359-0282/Fax: (619) 536-5500	7
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140	C.S.U. Industries, Inc..... (516) 239-4310/Fax: (516) 239-8374	33
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46	Dazel Corp. (800) 357-8357	39
164	Design 3000 Plus, Inc. (503) 585-0512/ Fax: (503) 585-1706	61
56	GE Capital..... (800) GE-RENTS	41
8	Herstal Automation (813) 358-2001/Fax: (813) 358-2010	55
	Hewlett-Packard (800) HP KNOWS	2,3
109	IEM, Inc. (970) 221-3005 or (800) 321-4671/ or /e-mail: info@iem.com	9
75	Inclination Software, Inc. (702) 831-5595/Fax: (702) 831-4979	63
98	InterWorks '96 (508) 436-6400 or http://www.interworks.org .	77
105	I/O Data Systems, Inc. (216) 835-2211/Fax: (216) 835-0220	75
117	ITAC Systems, Inc. - Mouse-Trak (214) 494-3073/Fax: (214) 494-4159	5
10	International User Conference '96 +358-0-752 3611, Fax +358-0-752 0899	93
129	Lund Performance Solutions..... (503) 926-3800	81
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13,12	Platinum Technology..... (708) 620-5000/Fax: (708) 691-0718	25,45
66	Procell Incorporated (303) 449-1100	67
67	Robelle Consulting Ltd..... (604) 582-1700/Fax: (604) 582-1799	87
29	SBE (800) 214-4SBE	17
180	Software Licensing Corp. (702) 832-0881	89
70	Software Moguls, Inc. (612) 932-6738/Fax: (612) 932-6736	11
77	Technical & Scientific Application..... (800) 422-4872/Fax: (713) 935-1555	29
49	Ted Dasher & Associates..... (800) 638-4833/Fax: (205) 591-1108	79
53	Tryonics (800) 551-6236	C-3
40	VESOFT, Inc..... (310) 282-0420/ Fax: (310) 785-9566	79
183	Vital Soft, Inc. (408) 745-7680/ Fax: (408) 745-6681	15
90	Volt Services Group (800) 422-8777 or (602) 955-8717	89
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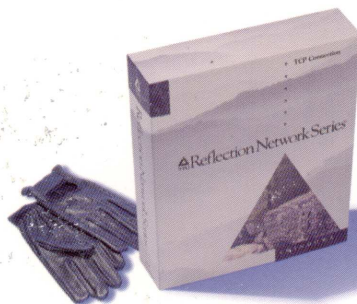
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